CITY OF ORILLIA

2021

Asset Management Plan

ORILLIA

The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

This Asset Management Plan was prepared by:

PSD | CITYWIDE

Empowering your organization through advanced asset management, budgeting & GIS solutions

Table of Contents

1 Executive Summary

1.1 Executive Summary

Municipal infrastructure supports the economic, social, and environmental health and growth of a community through the delivery of critical services. The goal of asset management is to deliver a defined level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

1.1.1 Scope

This Asset Management Plan (AMP) identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the City can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP includes the following asset categories:

With the development of this AMP the municipality has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022. There are additional requirements concerning current levels of service for all other capital assets and also proposed levels of service that must be met by July 1, 2024 and 2025.

1.1.2 Findings

The overall replacement cost of the asset categories included in this AMP totals $1,014.7 million. Eighty-three percent (83%) of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 76% of assets that had records. For the remaining 24% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP. It is essential to note that there are areas where there are limited asset records or low levels of data maturity, meaning that this AMP is not a full reflection of the City's assets and asset management requirements. Staff are aiming to collect more data and records to enhance the confidence level in future iterations of the AMP.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads and bridges) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing core infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the City's average annual capital requirement totals $18.0 million. Based on a historical analysis[1] of sustainable capital funding sources, the City is committing approximately $16.1 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $1.9 million.

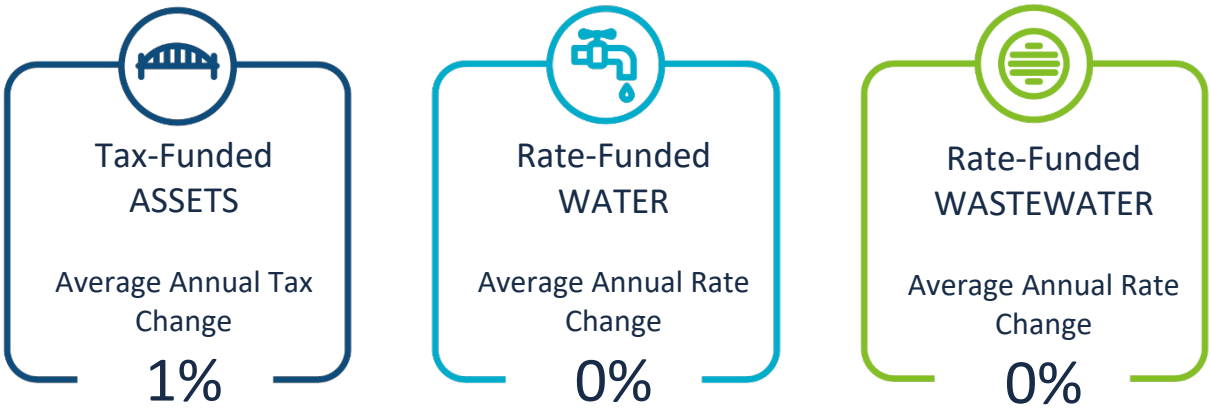
[1] The historical analysis is based on financial information provided by the City. However, it is worth noting that these numbers are subject to fluctuation over the years.

It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the City. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources. There are areas of known deficiencies that are outlined within this document. Recommendations for rectifying these deficiencies in future AMPs have been included.

Annual Capital Requirements per Household[2]

1.1.3 Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the City's infrastructure deficit based on a 5-year plan for tax-funded assets and maintain the current rates for rate-funded assets: It is worth noting that the numbers below are reflective of the current data quality. Further enhancements of the data quality would increase the accuracy of the results.



Recommendations to guide continuous refinement of the City's asset management program include the following:

- Review data to update and maintain a complete and accurate dataset

[2] Annual Capital Requirements per Household were determined by dividing the Average Annual Capital Requirement by the number of households in Orillia (based on the 2016 Census data).

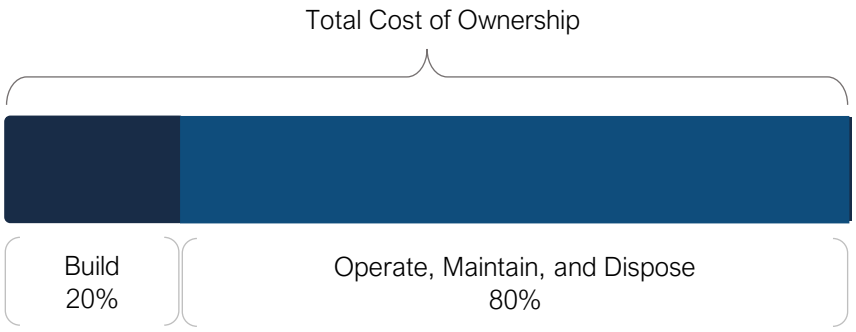
- Develop a condition assessment strategy with a regularly scheduled update and review process
- Continue to implement risk-based decision-making as part of asset management planning and budgeting
- Continually review, develop, and implement optimal lifecycle management strategies for all asset categories
- Continually review each asset's Estimated Useful Life to determine whether adjustments need to be made to better align with the observed length of service life for each asset type
- Develop and regularly review short- and long-term plans to meet capital requirements
- Adopt an Asset Management Strategy
- Update the Engineering Design Criteria Manual
- Measure current levels of service and identify sustainable proposed levels of service for all asset categories

2 Introduction & Context

2.1 An Overview of Asset Management

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

The acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% derives from operations, maintenance, and disposal. This Asset Management Plan (AMP) focuses its analysis on the capital costs to rehabilitate and replace existing municipal infrastructure assets as well as to capture the growth requirements as set out in O. Reg. 588/17.



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An AMP is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an AMP.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

2.1.1 Strategic Plan

A Strategic Plan serves as a roadmap and sets the stage for decision making and priority setting for a municipality over the next several years.

“Sustainable Growth” was identified as one of the six themes that are key to achieving the City’s vision and mission as part of the City of Orillia Strategic Plan.

The objective of sustainable growth is to ensure that the unique attributes and the sense of community are maintained as the City grows. It is also intended to ensure that the financial, infrastructure, and natural resources of the City are managed responsibly and that the City’s growth does not place an undue burden on its residents. By focusing on sustainable growth, the City will create diversified growth from which the community as a whole benefits.

Future iterations of this AMP will focus on the growth component associated to infrastructure planning.

2.1.2 Asset Management Policy

An asset management policy represents a statement of the principles guiding the municipality’s approach to asset management activities. It aligns with provincial regulations, the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The City adopted Policy 1.10.5.1 “Strategic Asset Management” on May 6, 2019, in accordance with Ontario Regulation 588/17.

The purpose of the policy is to provide a framework for implementing asset management to enable strategic approach at all levels of the organization. As outlined in the policy, the City seeks to deliver value to the community through effective management of existing and new infrastructure assets. The intent is to maximize benefits, reduce risk and provide satisfactory levels of service to the community in a sustainable and transparent manner.

2.1.3 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the municipality plans to achieve asset management objectives through planned activities and decision-making criteria.

The City's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document. It is worth noting that it is best practice to have a separate strategic document serving as an Asset Management Strategy.

2.1.4 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the municipality's asset management program and identifies the resource requirements needed to achieve a defined level of service. The AMP typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

The AMP is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the municipality to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

2.2 Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

2.2.1 Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. There are several field intervention activities that are available to extend the life of an asset. These activities can generally fall within the categories of maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

Lifecycle Activity	Description	Example (Roads)	Cost
Maintenance	Regular operational activities that prevent defects or deteriorations from occurring, resulting in allowing assets to reach their expected service life	Crack Seal	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

The City's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

2.2.2 Risk Management Strategies

Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community than that of others. For example, an arterial road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume local road. These high-value assets should receive funding before others in a similar condition.

By identifying the various impacts of asset failure and the likelihood that assets will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize rehabilitation and replacement strategies for critical assets.

2.2.3 Levels of Service

A level of service (LOS) is a measure of what the City is providing to the community and the nature and quality of that service. Within each asset category in this AMP, quantitative metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the City as worth measuring and evaluating. The City measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (Bridges and Culverts, Road Network, Stormwater Network, Wastewater Network, and Water Network) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP.

Technical Levels of Service

Technical levels of service are a measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures and tend to reflect the impact of the municipality's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories (Bridges and Culverts, Road Network, Stormwater Network, Wastewater Network, Water Network) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the City plans to establish proposed levels of service over a 10-year period. This will be completed before July 1, 2025 in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the City. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals and long-term sustainability. Once proposed levels of service have been established, and prior to July 2025, the City must identify a lifecycle management and financial strategy which allows these targets to be achieved.

2.3 Ontario Regulation 588/17

As part of the *Infrastructure for Jobs and Prosperity Act, 2015*, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg. 588/17). Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them.

The diagram below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

- Current levels of service
- Inventory analysis
- Lifecycle activities to sustain LOS
- Cost of lifecycle activities
- Population and employment forecasts
- Discussion of growth impacts

2024

Asset Management Plan for Core and Non-Core Assets (same components as 2022)

2025

Asset Management Policy Update and an Asset Management Plan for All Assets with the following additional components:

- Proposed levels of service for next 10 years
- Updated inventory analysis
- Lifecycle management strategy
- Financial strategy and addressing shortfalls
- Discussion of how growth assumptions impacted lifecycle and financial

2.3.1 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022 for core assets only. Next to each requirement a page or section reference is included in addition to any necessary commentary.

Requirement	O. Reg. Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	4.1.1 - 5.2.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1 - 5.2.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.3 - 5.2.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2 – 5.2.2	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.2 – 5.2.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.1.6 - 5.2.6	Complete
Current performance measures in each category	S.5(2), 2	4.1.6 - 5.2.6	Complete
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	4.1.4 - 5.2.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix A	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	6.1-6.2	Complete

3 Scope and Methodology

3.1 Asset categories included in this AMP

This asset management plan for the City of Orillia is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMP deadlines—requires analysis of only core assets (Bridges and Culverts, Road Network, Storm Network, Wastewater Network, and Water Network).

This AMP summarizes the state of the infrastructure for the City's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (KPIs), outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the asset categories listed below.

Asset Category	Source of Funding
Bridges and Culverts	Tax Levy
Road Network	
Stormwater Network[3]	
Wastewater Network	User Rates
Water Network	

[3] The Stormwater Network is partly funded by User Fees, Provincial Funding and Tax Levy. It has been placed with the tax-funded assets as taxes represent the biggest portion of funding available for the Stormwater Network in this AMP.

3.2 Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. While this AMP relies on the User-Defined Cost and Cost/Unit methodology[4], two common methodologies are outlined below:

1. **User-Defined Cost and Cost/Unit**: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience
2. **Cost Inflation/CPI Tables**: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the City incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

3.3 Estimated Useful Life and Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the City expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

By using an asset's in-service date and its EUL, the City can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the City can more accurately forecast when it will require replacement. The SLR is calculated as follows:

$$Service\ Life\ Remaining\ (SLR) = In\ Service\ Date + Estimated\ Useful\ Life(EUL) - Current\ Year$$

Using condition data and the asset's SLR, the City can more accurately forecast when it will require replacement.

[4] The City does not have historical cost on any of its assets (other than one stormwater pumping station). Replacement costs have been determined on user defined and cost per unit only.

3.4 Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the City can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$Target\ Reinvestment\ Rate = \frac{Annual\ Capital\ Requirement}{Total\ Replacement\ Cost}$$

$$Actual\ Reinvestment\ Rate = \frac{Annual\ Capital\ Funding}{Total\ Replacement\ Cost}$$

3.5 Deriving Asset Condition

An incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the City's asset portfolio. The table below outlines the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

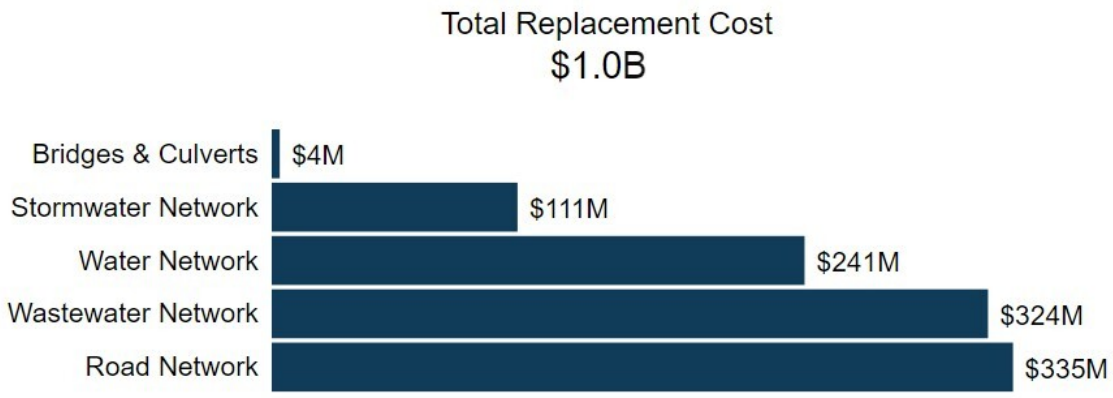
Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	81-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	61-80
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	41-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	21-40
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0-20

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix D includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

4 Portfolio Overview

4.1 Total Replacement Cost of Asset Portfolio

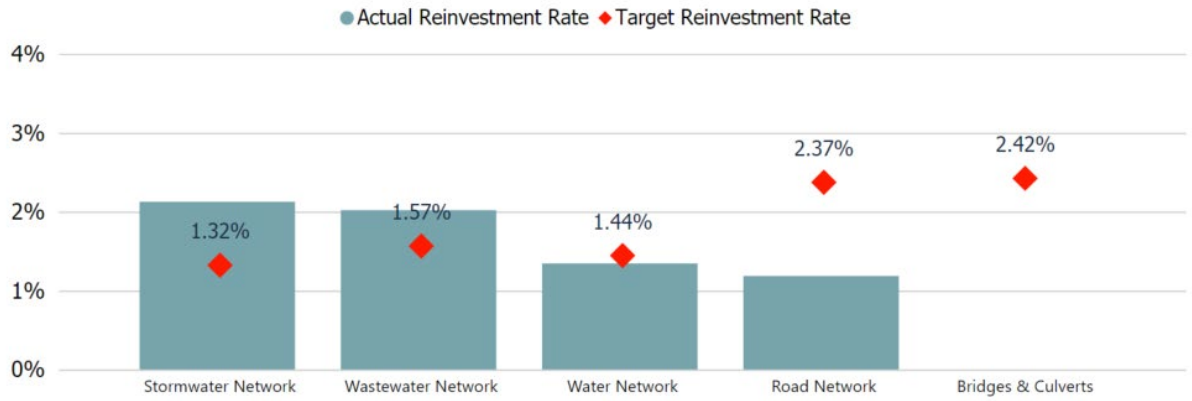
The asset categories analyzed in this AMP have a total replacement cost of $1,014.7 million based on inventory data from 2020. This total was determined based primarily on user-defined costs. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today. It is worth noting that some infrastructure may need to be upgraded if the municipality adopts a Climate Change Action Plan with recommendations to enhance infrastructure. The replacement costs may need to be adjusted accordingly.

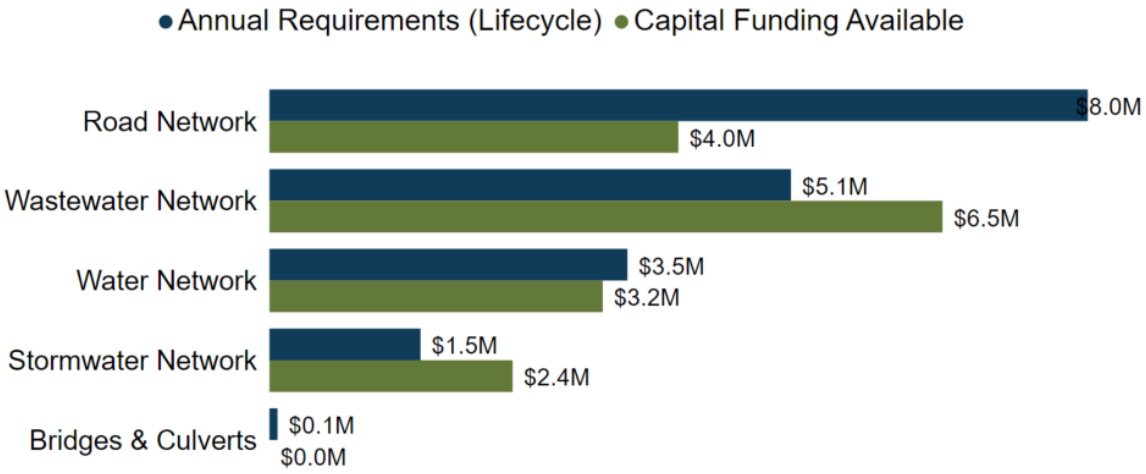


4.2 Target vs. Actual Reinvestment Rate

The graphs below depict funding gaps or surpluses by comparing target vs actual reinvestment rate for core assets. To meet the long-term replacement needs, the City should be allocating approximately $18.0 million annually, for a target reinvestment rate of 1.8%. Actual annual spending on infrastructure totals approximately $16.1 million, for an actual reinvestment rate

of 1.59%. The actual annual spending is based on the City's historical spending trends, sourced from the City's financial documents.

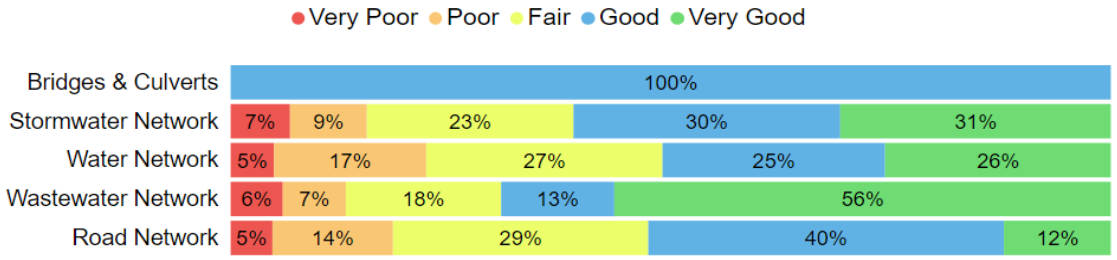




The low level of data maturity, especially for the Stormwater Network, is believed to cause an underestimation for the annual capital requirements. The City is working on refining the data in order to increase the level of accuracy of such estimates. The recent expansion of the water plant (Water Network) and growth-related investments in the Stormwater Network have inflated the capital funding available for the aforementioned asset categories. Proactive investment in asset growth is a good practice in asset management, resulting in spreading the financial burden associated with these investments over multiple generations.

4.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, approximately 83% of assets in Orillia are in fair or better condition. This estimate relies on both age-based and field condition data.



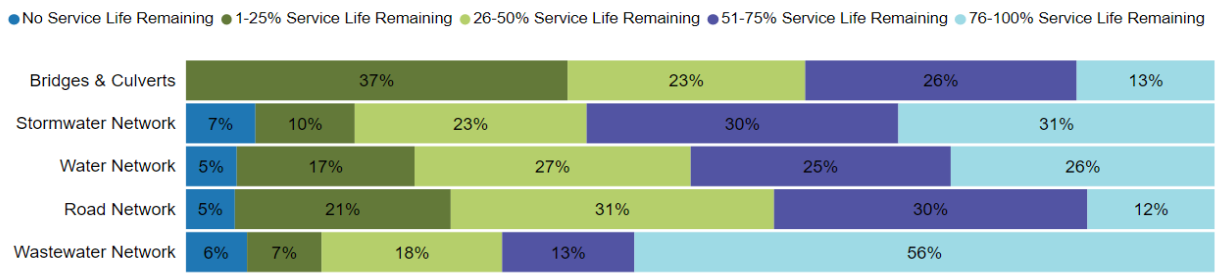
This AMP relies on assessed condition data for approximately 76% of assets; for the remaining portfolio, age is used as an approximation of condition. It is worth noting that this is only applicable for assets that the City has records for. It has been identified that there are records that are missing or incomplete, particularly within the Stormwater Network. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Bridges and Culverts	Bridges	100%	OSIM 2019
	Structural Culverts	100%	OSIM 2019
Road Network	Arterial Roads	100%	Streetlogix 2019
	Collector Roads		
	Local Roads		
Stormwater Network	Storm Linear Network	0%	Age-Based
	Storm Vertical Network (Pumping Stations)	95%	Staff Assessment 2020
	Storm Vertical Network (Other Assets)	0%	Age-Based
Wastewater Network	Wastewater Linear Network (Forcemains)	0%	Age-Based
	Wastewater Linear Network (Sewermains <200mm)	0%	Age-Based
	Wastewater Linear Network (Sewermains 200-300mm)	68% Assessed	CCTV Inspections

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Wastewater Network	Wastewater Linear Network (Sewermains >300mm)	61% Assessed	CCTV Inspections
	Wastewater Vertical Network (Pumping Stations)	100% Assessed	Staff Assessment 2020
	Wastewater Vertical Network (Wastewater Treatment Centre)	100% Assessed	Staff Assessment 2020
Water Network	Water Linear Network (Watermains <200mm)	0%	Age-Based
	Water Linear Network (Watermains 200-300mm)	0%	Age-Based
	Water Linear Network (Watermains >300-450mm)	0%	Age-Based
	Water Linear Network (Watermains >450mm)	0%	Age-Based
	Water Vertical Network (Booster Station)	100% Assessed	Staff Assessment 2020
	Water Vertical Network (Reservoirs & Wells)	100% Assessed	Staff Assessment 2020
	Water Vertical Network (Water Filtration Plant)	99% Assessed	Ainley and Associates - WFP Condition Assessment and Staff Assessment 2020

4.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 18.89% of the City's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A.



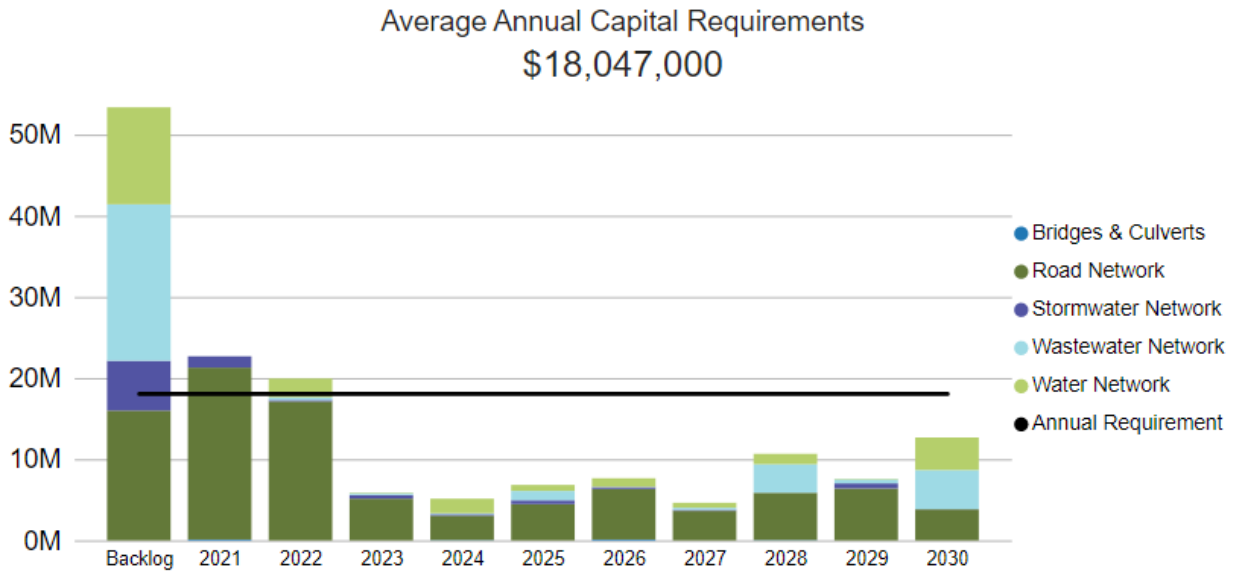
4.5 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the City can produce an accurate long-term capital forecast. Rehabilitation and replacement needs are generated across the entire design life of each asset. The following graph identifies capital requirements over the next 10 years only.

The spending peaks in 2021 and 2022 are due to the fact that multiple lifecycle activities are due in these years for a significant number of roads that have a condition score that is approaching 4.0. These activities include replacement and rehabilitation. Furthermore, the $16 million backlog is associated to the multiple roads that have a condition score that is higher than 4.0, which means that these roads are due for replacement. The spending over the remaining years decreases as not many high value assets are due for replacement during these years

Furthermore, investing in proactive lifecycle strategies will help the city extend the useful life of assets and therefore increase the spans between asset replacements, which would eventually help the City decrease the average annual requirements and avoid spending peaks.

Moreover, forecasting long-term capital requirements helps the City in identifying years with major capital investments in order to proactively distribute the spending over a longer time span. Investments can be prioritized based on risk and levels of service.



5 Analysis of Tax-funded Assets

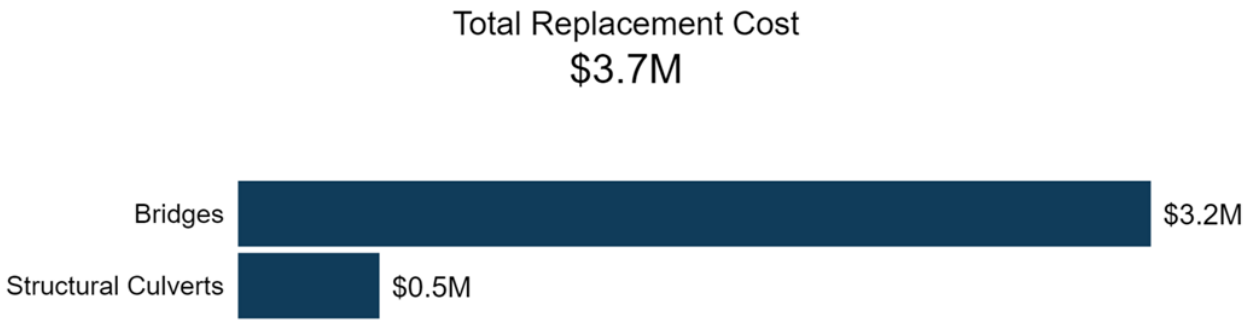
5.1 Bridges and Culverts

Bridges and Culverts represent an important portion of the transportation services provided to the community. City staff is required to inspect these structures every 2 years according to the Ontario Structure Inspection Manual (OSIM).

5.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Bridges and Culverts inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	5[5]	CPI Tables	$3,215,049
Structural Culverts	1	CPI Tables	$498,661
	6		**$3,713,710**

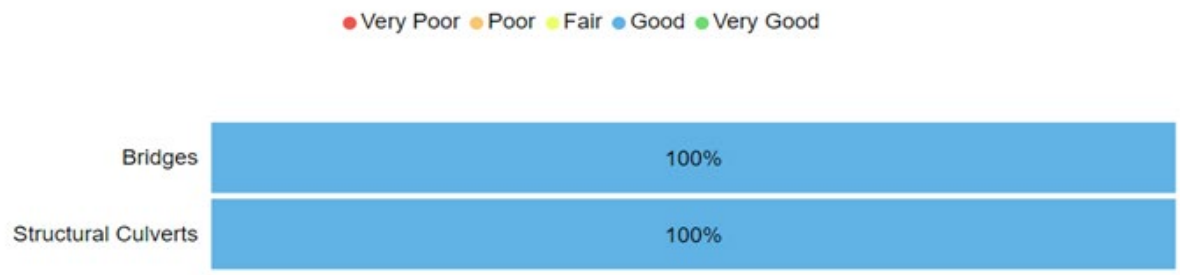


[5] The two Brough's Creek Bridges are subject to a cost-sharing agreement between the City and the Township of Oro-Medonte.

5.1.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition is a weighted value based on replacement cost.

Asset Segment	Average Condition (1-5)	Average Condition Rating	Condition Source
Bridges	2.3	Good	OSIM 2019
Structural Culverts	2.1	Good	OSIM 2019
	2.2	**Good**	



To ensure that the City's Bridges and Culverts continue to provide the current level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Bridges and Culverts.

Current Approach to Condition Assessment

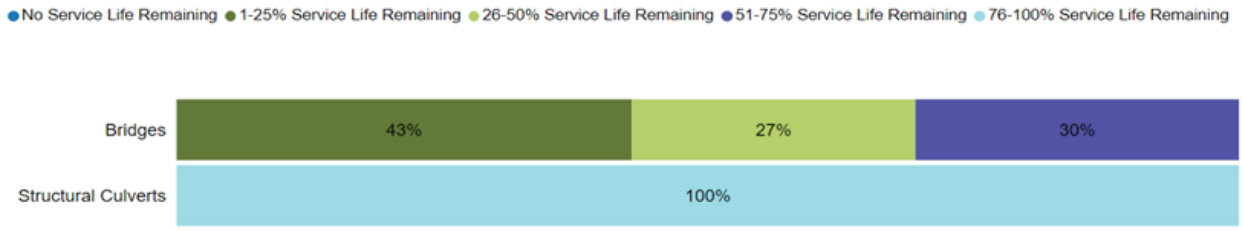
All municipally-owned bridges and structural culverts with a span greater than or equal to 3 metres are required to be inspected every two years according to the Ontario Structure Inspection Manual (OSIM). All structures receive a Bridge Condition Index (BCI) Rating between 0-100. The most recent OSIM inspections were completed in 2019.

5.1.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges and Culverts has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining. In this specific case, the

condition of Bridges and Culverts sourced from the OSIM is better than the calculated age-based condition. Therefore, the Average Service Life Remaining was extended.

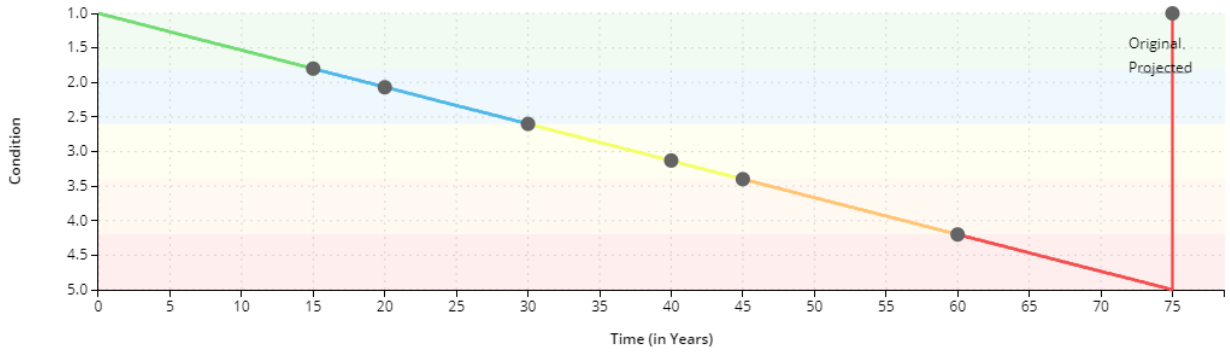
Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	75	65.4	25.4
Structural Culverts	75	8.0	67.0
		55.8	**32.3**



5.1.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of bridges and culverts. Instead of allowing the bridges and culverts to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of bridges and culverts at a lower total cost. However, it is worth noting that in this case, the rehabilitation activities are necessary to allow the asset to reach an Estimated Useful Life of 75 years. Therefore, as these activities were not properly documented in the past due to data quality issues, the strategic rehabilitation strategy is appearing to be more costly than the run to failure scenario.



Bridges and Culverts		
Event Name	**Event Class**	**Event Trigger**
Deck Re-surfacing	Rehabilitation	Repeat every 15 Years 4 times
Structural Repairs	Rehabilitation	Repeat every 20 Years 3 times
Asset Replacement	Replacement	Condition: 5

The following table outlines the City's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance[6]	There are few maintenance strategies for bridges and culverts and little to no budget available for bridge maintenance annually
Rehabilitation/Replacement	While the OSIM reports do typically include recommended capital activities, bridge rehabilitation has not been a significant priority in recent years and lifecycle strategies have been purely reactive
	Currently there are no bridge rehabilitation or replacement projects listed in the 10-year capital plan

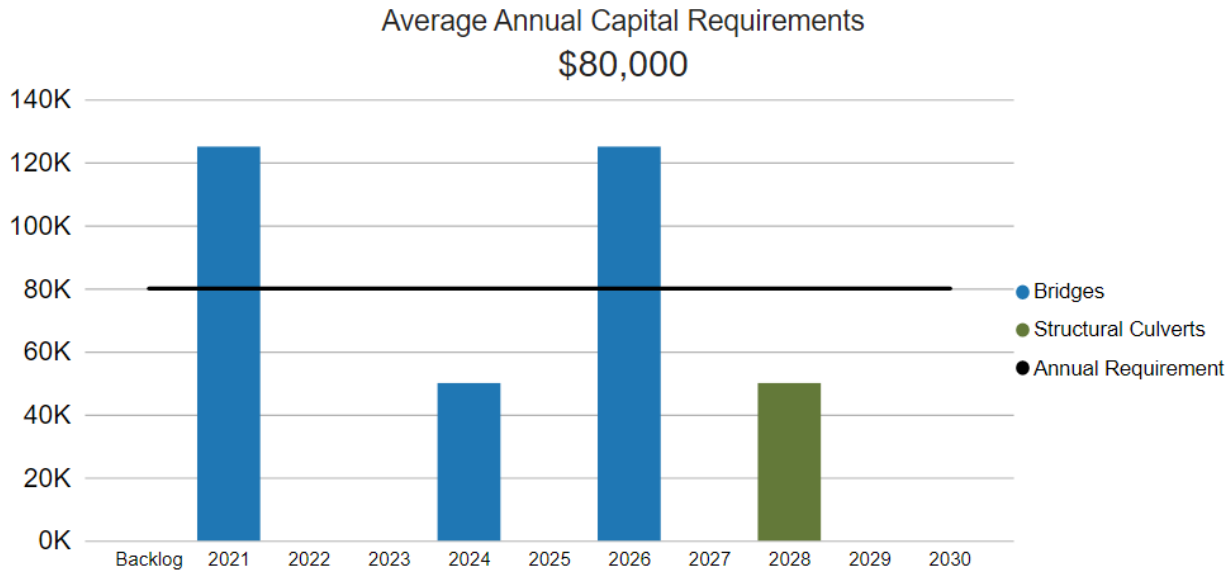
Forecasted Capital Requirements

Rehabilitation and replacement needs are generated across the entire design life of each asset. The following graph identifies capital requirements over the next 10 years only. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.

[6] Maintenance activities are an operational expense, not a capital expense

The backlog value for Bridges and Culverts assets is zero since no lifecycle activities were overdue at the time of the analysis. The investment required in future years is reflective of the replacement and rehabilitation activities due in each of the following years. The rehabilitation and replacement activities are identified based on the projected condition.

Moreover, forecasting long-term capital requirements helps the City in identifying years with major capital investments in order to proactively distribute the spending over a longer time span. Investments can be prioritized based on risk and levels of service.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure. The metrics that have been used to determine both can be found in Appendix C.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

	**Climate Change & Extreme Weather Events**
	An increase in freeze/thaw cycles causes bridge components to deteriorate. This leads to an increased need for maintenance and rehabilitation. Intense storm events may cause flash flooding and hydraulic issues. The uncertainty surrounding the impact of extreme weather events can make changing conditions difficult to plan for.
	**Infrastructure Re-investment**
	As there are only five bridges and one structural culvert within the City of Orillia, bridges and culvert infrastructure has often been considered low priority for planning and investment.
	**Lifecycle Management Strategies**
	The OSIM inspections are completed every two years, resulting in recommendations that are then brought into capital plans. A detailed process to review projects resulting in scheduling the activities and projects may add more value.

5.1.6 Levels of Service

The following tables identify the City's current level of service for Bridges and Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Bridges and Culverts.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the City's transportation network. One of the municipality's structures has a loading or dimensional restriction.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	Appendix B
	Description or images of the condition of culverts and how this would affect use of the culverts	Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by Bridges and Culverts.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges in the City with loading or dimensional restrictions	20%
Quality	Average bridge condition index value for bridges in the City	2.23[7]
	Average bridge condition index value for structural culverts in the City	2.06[4]
Performance	Capital re-investment rate	0%[8]

5.1.7 Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every two years.

[7] The bridge condition index used is a 1-5 scale index, with 1 being the best and 5 being the worst.

[8] Bridges have typically been funded through the roads reserve. Therefore, the capital reinvestment figure is not available.

Condition

- Ensure that the condition ratings from OSIM are entered into asset inventory to support planning for deterioration modeling.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequence of asset failure.

Lifecycle Management Strategies

- The City should continue working towards identifying projected capital rehabilitation and renewal costs for bridges and culverts and integrating these costs into long-term planning.
- Continue working towards developing lifecycle models to prolong estimated useful life and optimize funding.
- There is currently a 0% budget allocation for bridge and culvert structures as these assets use the roads reserve as a source of funding. The City should start tracking the annual spending on bridges and culverts separately for the purposes of asset management.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

5.2 Road Network

The Road Network is a critical component for the provision of safe and efficient transportation services and represents the highest value asset category in the City's asset portfolio. It includes all municipally owned and maintained roadways, including arterial, collector, and local roads.

The City is responsible for the road work within the City, including road reconstruction activities and spring sand cleanups. Reconstruction activities include drainage improvements, curb and gutter replacement or installation, traffic signal replacement, and sidewalk replacement.

Furthermore, the condition of each road is targeted to be evaluated at least once every two years to provide guidance when selecting projects for reconstruction or resurfacing.

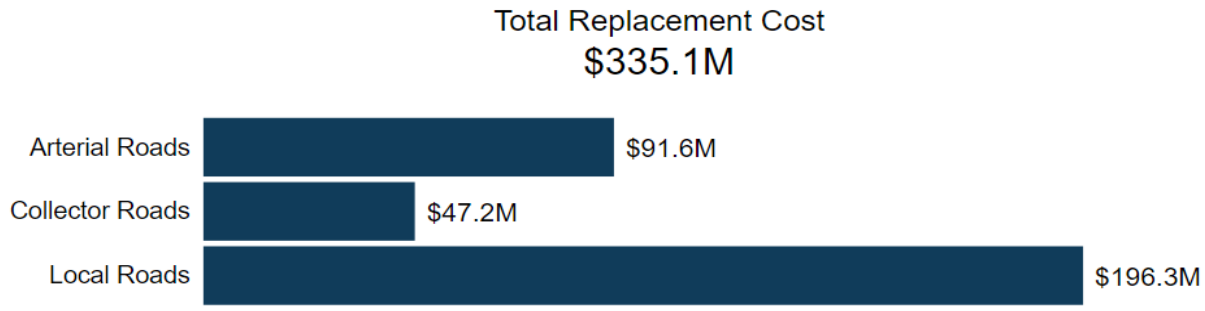
Road work is generally broken down into three groups:

- Major work on arterial roads
- Rebuilding local and collector roads
- Resurfacing

5.2.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Road Network inventory.

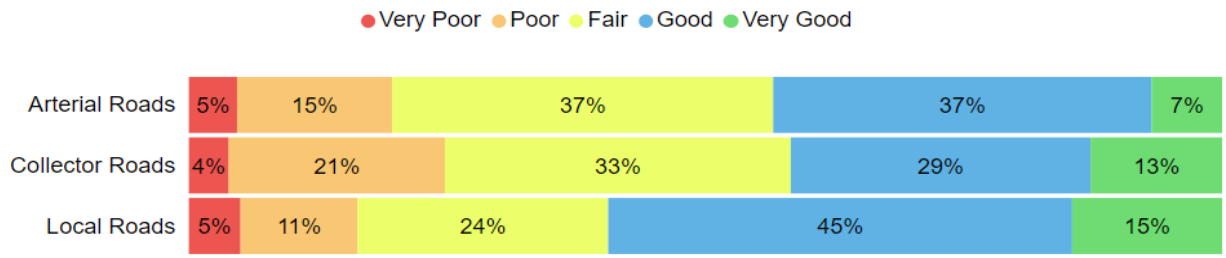
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Arterial Roads	103 Lane-km	Cost/Unit	$91,630,730
Collector Roads	53 Lane-km	Cost/Unit	$47,218,268
Local Roads	220 Lane-km	Cost/Unit	$196,263,540
			$335,112,538



5.2.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (1-5)	Average Condition Rating	Condition Source
Arterial Roads	3.1	Fair	Streetlogix 2019
Collector Roads	3.1	Fair	Streetlogix 2019
Local Roads	3.0	Fair	Streetlogix 2019
	3.0	**Fair**	



To ensure that the City's Road Network continues to provide the current level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Road Network.

Current Approach to Condition Assessment

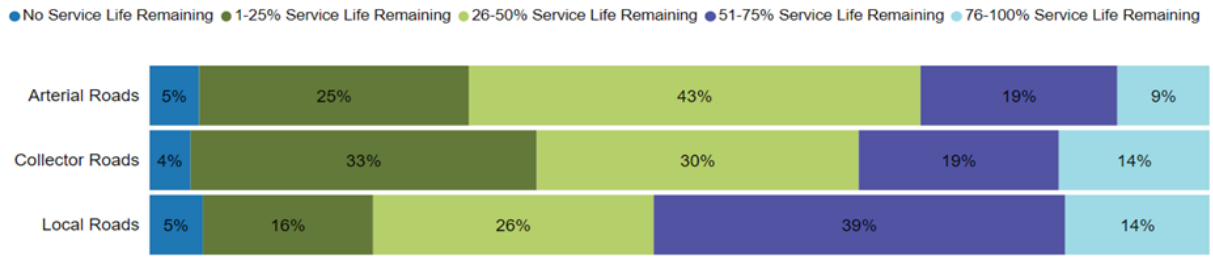
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The City of Orillia uses Streetlogix assessment scoring for Pavement Condition Index (PCI), which is based on the rating system developed by the Ontario Ministry of Transportation. The PCI is graded from 0-100, based on the surface cracking, ride condition, depressions, or elevations.

Network-wide condition assessments are expected to be completed every two years moving forward using the same methodology to ensure standardization and comparability of road condition ratings.

5.2.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Road Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Arterial Roads	25 Years	16.9	9.3
Collector Roads	25 Years	17.0	9.4
Local Roads	25 Years	15.2	10.8
		15.8	**10.3**

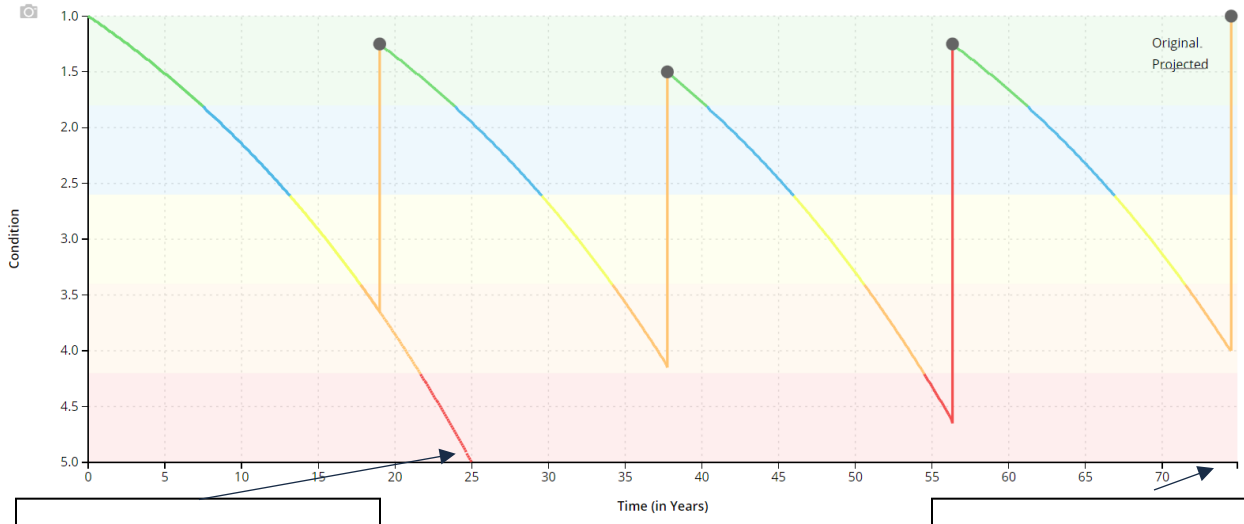


5.2.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of paved roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Paved Roads		
Event Name	**Event Class**	**Event Trigger**
Re-Surfacing (1st Cycle)	Rehabilitation	Condition: 3.65
Re-Surfacing (2nd Cycle)	Rehabilitation	Condition: 4.15
Full Depth Reclamation (3rd Cycle)	Rehabilitation	Condition: 4.65
Full Road Reconstruction	Replacement	Condition: 4



The following table further expands on the City's current approach to lifecycle management:

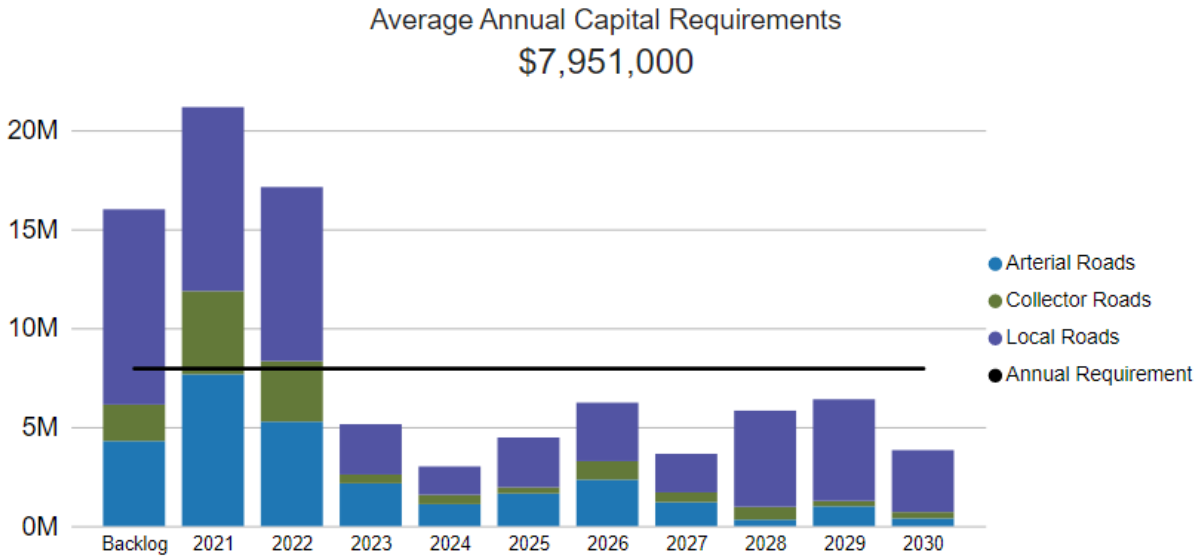
Activity Type	Description of Current Strategy
Maintenance[9]	Annual road maintenance includes budget for spot repairs, pothole patching, and other maintenance activities required to meet Minimum Maintenance Standards
	Most road maintenance activities are completed by City staff with external contractors brought in to address road sections that require significant asphalt patching
Rehabilitation	Road rehabilitation activities are completed when significant pavement distresses are identified that cannot be addressed through regular road maintenance practices
	The most common road rehabilitation activity is full depth reclamation occurring approximately every 15-20 years
	The decision-making process that determines whether a road requires rehabilitation or full reconstruction depends on sub-surface infrastructure requirements (e.g. water, sewer, storm)
Replacement	Roads are considered end of life when vehicles are no longer able to drive along them effectively at the posted speed limit. This is considered to be at a Pavement Condition Index of 50 or below, which is a condition level of 5 (very poor)
	City Staff plan for a 75-year lifecycle before roads typically require full reconstruction, to align reconstruction with sub-surface infrastructure requirements and reduce total costs
	The City's capital plan includes a 10-year planning horizon with named projects

Forecasted Capital Requirements

Rehabilitation and replacement needs are generated across the entire design life of each asset. Based on the lifecycle strategies identified previously for paved roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Network over the next 10 years only.

The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

[9] Maintenance activities are an operational expense, not a capital expense.



The spending peaks in 2021 and 2022 are due to the fact that multiple lifecycle activities are due in these years for a significant number of roads that have a condition score that is approaching 4.0. These activities include replacement and rehabilitation. Furthermore, the $16 million backlog is associated to the multiple roads that have a condition score that is higher than 4.0, which means that these roads are due for replacement.

Furthermore, investing in proactive lifecycle strategies will help the city extend the useful life of assets and therefore increase the spans between asset replacements, which would eventually help the City decrease the average annual requirements and avoid spending peaks.

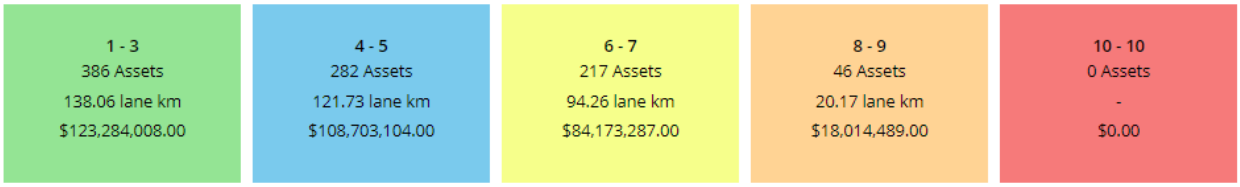
Moreover, forecasting long-term capital requirements helps the City in identifying years with major capital investments in order to proactively distribute the spending over a longer time span. Investments can be prioritized based on risk and levels of service.

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure. The metrics that have been used to determine both can be found in Appendix C.



Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

	**Climate Change & Extreme Weather Events**
	An increase in freeze/thaw cycles causes road pavement to heave and settle. This can cause an accelerated deterioration of road surface pavement which leads to an increased need for maintenance and rehabilitation. The uncertainty surrounding the impact of extreme weather events can make changing conditions difficult to plan for.
	**Infrastructure Design/Installation**
	The City is getting better at standardizing engineering designs and ensuring that these are coordinated across the department through its 2015 Engineering Design Criteria Manual (DCM), which is due to be updated. Further efforts and refinements are continuously needed to enhance the process.
	**Infrastructure Re-investment**
	The calculations in this AMP indicate that it may be difficult for the City to match the annual lifecycle requirements with its budget, which would result in an infrastructure deficit. Furthermore, not being able to perform lifecycle activities when they are planned would result in increased spending over the lifecycle of concerned infrastructure systems.

5.2.6 Levels of Service

The following tables identify the City's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Road Network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	The City of Orillia uses Streetlogix assessment scoring for Pavement Condition Index (PCI), which is based on the rating system developed by the Ontario Ministry of Transportation. The PCI is graded from 0-100, based on the surface cracking, ride condition, depressions or elevations. See Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Road Network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	3.6
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	1.8
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	7.7
Quality	Average pavement condition index for paved roads in the municipality	78.2
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	Capital reinvestment rate	1.19%

5.2.7 Recommendations

Asset Inventory

- Continue to review and refine the Road Network's asset inventory to ensure new assets and betterments, as well as other transportation assets (sidewalks, streetlights, trails, and signs) are reflected, and attributes are detailed.

Condition Assessment Strategies

- Network-wide assessment are completed every three years. Prioritize regular cursory inspections in between comprehensive assessments using consistent and standardized condition rating criteria.
- Continue to develop and conduct condition assessment programs for all other transportation assets (sidewalks, streetlights, trails, and signs) in preparation of including those assets in a future AMP.

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the City's lifecycle management strategies at regular intervals to determine the impact on cost, condition, and risk.
- Develop cursory life cycle management strategies for all other transportation assets (sidewalks, streetlights, trails, and signs).

Risk Management Strategies

- Continue to implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to the availability of additional data and also an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

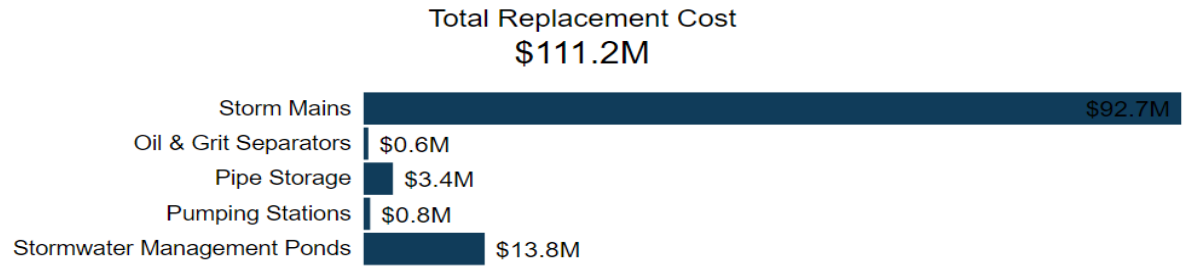
5.3 Stormwater Network

The City owns and maintains a stormwater network of storm sewer mains and other supporting infrastructure[10]. The City of Orillia completed the development of a comprehensive stormwater management master plan (CSWM-MP) in accordance with the Lake Simcoe Protection Plan in 2016. It is worth noting that the Stormwater Network Inventory is still at a basic level of maturity. It has been identified that there are records that are missing or incomplete, which is common across municipalities. The report findings are based on the available data and records. As the City continues to refine the data with time, the findings will become more accurate.

5.3.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Stormwater Network inventory.

Asset Segment	Asset Sub-Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Storm Linear Network	Storm Mains	48,300m	Cost/Unit	$92,735,564
Storm Vertical Network	Oil & Grit Separators	3	User-Defined Cost	$564,999
Storm Vertical Network	Pipe Storage	7	User-Defined Cost	$3,352,000
Storm Vertical Network	Pumping Stations	2	User-Defined Cost	$769,976
Storm Vertical Network	Stormwater Management Ponds	5	User-Defined Cost	$13,760,000
				$111,182,539

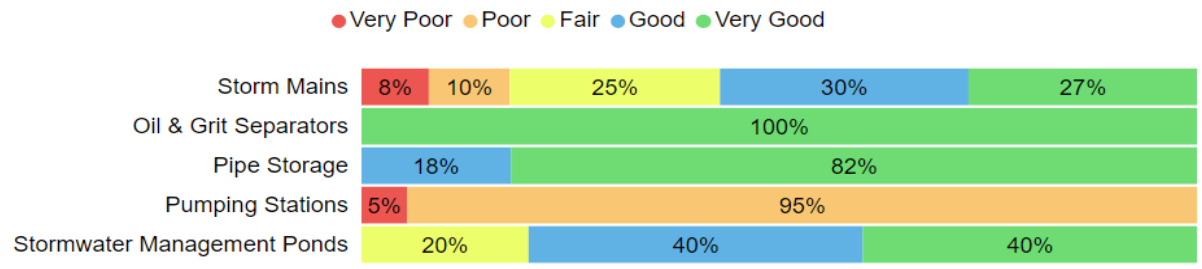


[10] At this time, open and paved ditches have not been included in this Plan. Data is currently unreliable.

5.3.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Asset Sub-Segment	Average Condition (1-5)	Average Condition Rating	Condition Source
Storm Linear Network	Storm Mains	2.9	Good	Age-Based
Storm Vertical Network	Oil & Grit Separators	1.9	Very Good	Age-Based
Storm Vertical Network	Pipe Storage	2.3	Good	Age-Based
Storm Vertical Network	Pumping Stations	4.1	Poor	Staff Assessments 2020
Storm Vertical Network	Stormwater Management Ponds	2.3	Good	Age-Based
		2.9	**Good**	**97% Age-Based**



To ensure that the City's Stormwater Network continues to provide the current level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Stormwater Network.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. In recent years, the City has expanded its CCTV inspection program for storm sewer mains. There is

currently a 17-year cycle to inspect the entire network. However, given that this is a recent initiative there is not very much condition data available at this time.

Staff are also using CCTV inspections to verify and confirm inventory data including length, material, and pipe diameter.

The findings and results of this AMP are based on the available data and records. Therefore, the level of confidence in the analysis is relatively low as it has been identified that there are records that are missing or incomplete. The City is working towards enhancing its data quantity and quality in order to be able to perform more detailed and accurate analytics in future iterations of the AMP.

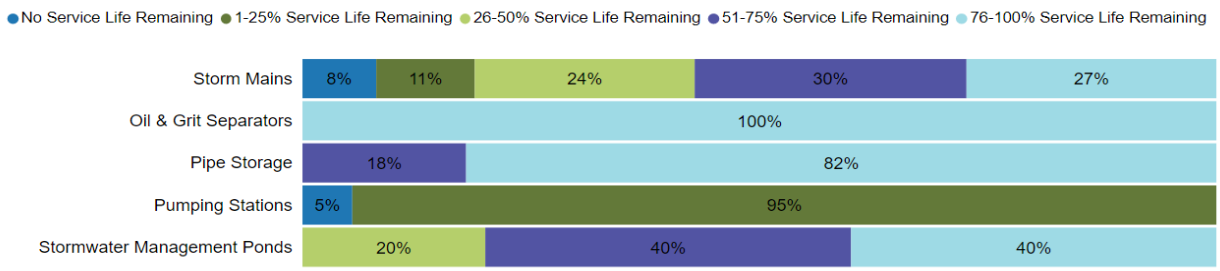
5.3.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Stormwater Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service[11]. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

In this specific case, the Average Service Life of Pumping Stations has been expended due to the asset conditions generated from the staff assessments in 2020.

Asset Segment	Asset Sub-Segment	Estimated Useful Life (Years)	Average Asset Age (Years)	Average Service Life Remaining (Years)
Storm Linear Network	Storm Mains	50-100	35.8	39.0
Storm Vertical Network	Oil & Grit Separators	50	10.7	39.3
Storm Vertical Network	Pipe Storage	80	26.8	53.2
Storm Vertical Network	Pumping Stations	5-40	53.5	5.8
Storm Vertical Network	Stormwater Management Ponds	100	32.8	67.2
			35.8	**38.9**

[11] The Stormwater Linear Network in-service dates were estimated based on the age of adjacent water infrastructure since the City does not possess accurate data for its Stormwater Network.



5.3.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following table outlines the City's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance[12]	Storm sewer flushing is completed in coordination with CCTV inspections on a 15-year cycle for the entire network.
	Catch basins and outfalls are cleaned annually to clear blockages and ensure stormwater runoff is efficiently conveyed through the storm sewer network
	Stormwater facility maintenance is an annual request as part of the Stormwater Rehabilitation Program capital budget request
Rehabilitation/ Replacement	Storm sewer mains are typically left until replacement is required unless there is structural failure
	Staff attempt to align storm sewer reconstruction requirements with planned road reconstruction to reduce total costs through project coordination

Forecasted Capital Requirements

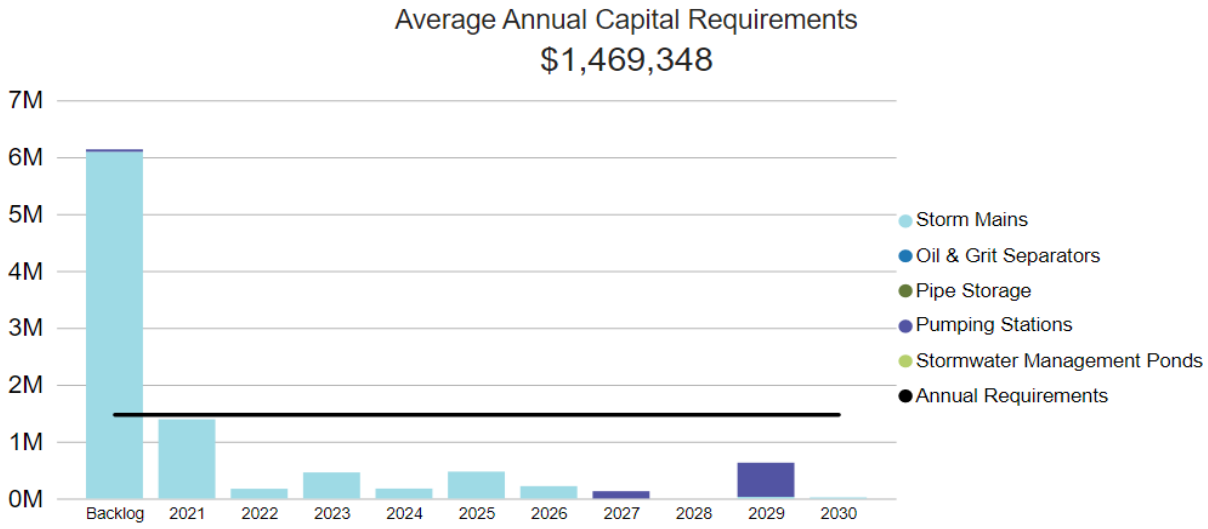
Rehabilitation and replacement needs are generated across the entire design life of each asset. The following graph identifies capital requirements over the next 10 years only. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs. Further improvement is this area is still required as the analysis is based on the current incomplete data. A higher data maturity would result in more accurate representation of results, and likely higher associated costs as having a more robust inventory would result in capturing more assets and more precise replacement costs in the analysis. When the portfolio of assets increases in quantity and value, the average

[12] Maintenance activities are an operational expense, not a capital expense.

annual capital requirements also increase to become better representative of the actual annual spending required to manage the revised quantities of assets.

The significant backlog identified in the graph below is due to the fact that a significant number of storm mains have no more remaining useful life based on age. The investment required in future years is reflective of the replacement activities due in each of the following years. The rehabilitation and replacement activities are identified based on the age-based projected condition. As condition assessments will be completed, this will result in a better representation and condition and therefore more accurate forecasted capital requirements.

Moreover, forecasting long-term capital requirements helps the City in identifying years with major capital investments in order to proactively distribute the spending over a longer time span. Investments can be prioritized based on risk and levels of service.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.3.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure. The metrics that have been used to determine both can be found in Appendix C.

1 - 3	4 - 5	6 - 7	8 - 9	10 - 10
183 Assets	313 Assets	182 Assets	198 Assets	0 Assets
10,703.83 m, unit(s)	15,454.55 m, unit(s)	8,056.94 m, unit(s)	14,084.31 m, unit(s)	-
$20,748,469.43	$44,301,804.55	$18,438,171.74	$27,694,093.51	$0.00

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

	**Asset Data & Information**
	There is a lack of confidence in the available inventory data for Stormwater Network. Staff plan to prioritize data refinement efforts to increase confidence in the accuracy and reliability of asset data and information. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.
	**Climate Change & Extreme Weather Events**
	The current standards may not be able to accommodate the actual changes to rainfall events. The uncertainty around the impact of intensity, frequency, and duration of rainfall events can make changing conditions difficult to plan for. Therefore, the City is trying to incorporate more Low Impact Developments (LIDs). The City is currently undertaking a Climate Change Action Plan which may identify recommended core infrastructure upgrades.
	**Infrastructure Design/Installation**
	There is an opportunity to modify design standards to ensure that proper materials are used. City Policy encourages the inclusion of Low Impact Developments (LIDs) including bioswales and other green infrastructure.
	**Infrastructure Re-investment**
	The lack of confidence in the available inventory data for Stormwater Network causes inaccuracies in estimating the required re-investment in the network. However, the City staff do believe that the Stormwater Network is underfunded. Once more accurate data is collected, better re-investment estimates can be calculated, resulting in better quantifying the infrastructure deficit for the Stormwater Network.

5.3.6 Levels of Service

The following tables identify the City's current level of service for the Stormwater Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Stormwater Network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	See Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Stormwater Network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality resilient to a 100-year storm	Not Available[13]
	% of the municipal stormwater management system resilient to a 5-year storm	Not Available[8]
Performance	Capital reinvestment rate	2.13%

[13] The City does not currently have data available to confidently determine the resilience of the stormwater management system. To accurately assess the amount of area that adequately conveys a 5-year and 100-year event with no impact to properties and/or infrastructure, a hydrologic and hydraulic model would need to be developed.

5.3.7 Recommendations

Asset Inventory

- The City's Stormwater Network inventory remains at a basic level of maturity and staff do not have a high level of confidence in its accuracy or reliability. The development of a comprehensive inventory of the Stormwater Network should be a priority.

Condition Assessment Strategies

- The results of the CCTV inspections should be integrated in the development of a comprehensive inventory. The inventory should be updated periodically as the CCTV inspection program generates more accurate data.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to the availability of data and an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Stormwater Network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.
- Develop preventative maintenance programs to maintain current levels of service.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the City has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options.

6 Analysis of Rate-funded Assets

6.1 Wastewater Network

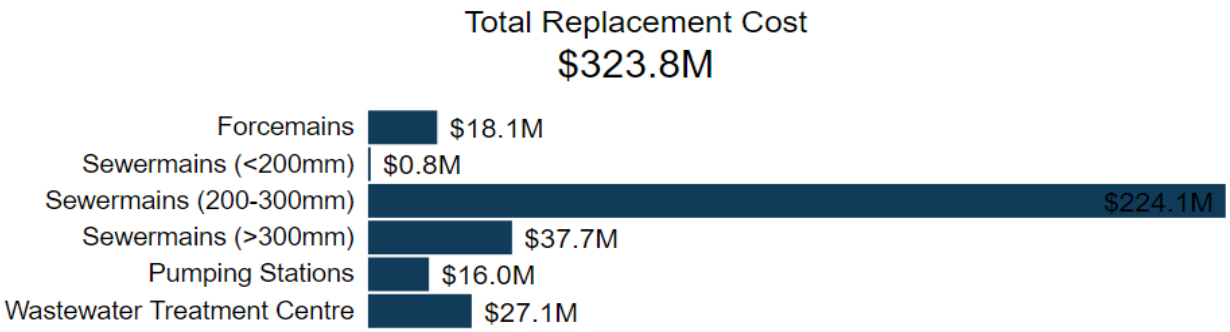
The Wastewater Network services provided by the City include sewermains, pumping stations, forcemains and a Wastewater Treatment Centre.

Linear assets include Forcemains and Sewermains. Vertical assets include pumping stations and the Wastewater Treatment Centre.

6.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Wastewater Network inventory.

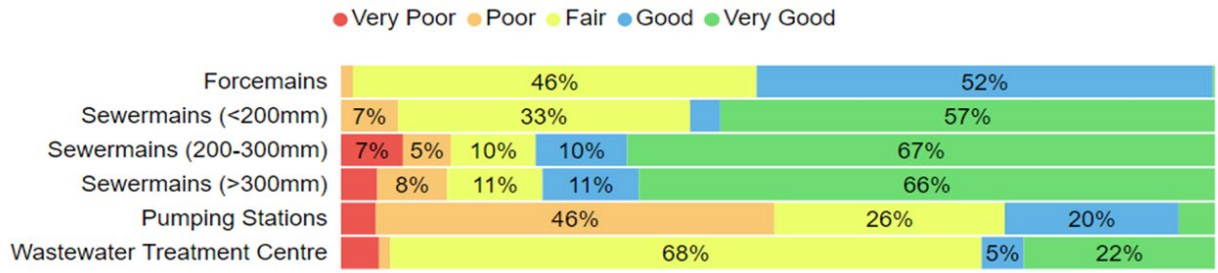
Asset Segment	Asset Sub-Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Wastewater Linear Network	Forcemains	11,022m	Cost/Unit	$18,142,311
Wastewater Linear Network	Sewermains (<200mm)	460m	Cost/Unit	$757,545
Wastewater Linear Network	Sewermains (200-300mm)	136,154m	Cost/Unit	$224,109,375
Wastewater Linear Network	Sewermains (>300mm)	22,896m	Cost/Unit	$37,687,237
Wastewater Vertical Network	Pumping Stations	20	User-Defined Cost	$15,983,000
Wastewater Vertical Network	Wastewater Treatment Centre	1	User-Defined Cost	$27,143,500
				$323,822,968



6.1.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition is a weighted value based on replacement cost.

Asset Segment	Asset Sub-Segment	Average Condition (1-5)	Average Condition Rating	Condition Source
Wastewater Linear Network	Forcemains	3.1	Fair	Age-Based
Wastewater Linear Network	Sewermains (<200mm)	2.4	Good	CCTV Inspections and Age
Wastewater Linear Network	Sewermains (200-300mm)	2.1	Good	CCTV Inspections and Age
Wastewater Linear Network	Sewermains (>300mm)	2.1	Good	CCTV Inspections and Age
Wastewater Vertical Network	Pumping Stations	3.0	Fair	Staff Assessment
Wastewater Vertical Network	Wastewater Treatment Centre	2.6	Good	Staff Assessment
		2.2	**Good**	



To ensure that the City's Wastewater Network continues to provide the current level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Wastewater Network.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets.

The City of Orillia uses NASSCO Pipe assessment scoring for the linear network (except for forcemains), which is the standard used by companies that perform CCTV inspections of sewers in Ontario. NASSCO scoring uses a grading system of one to five for defects (five being the worst) as well as quantifying the number of each defect level. A level five defect is a major defect and indicates that the sewer has failed or has the potential to fail imminently at any time.

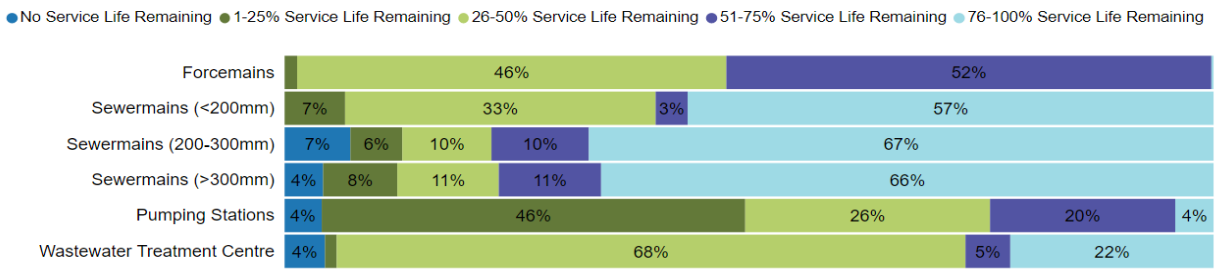
Currently, there is no formal procedure for condition assessment of Wastewater vertical assets, however, the City is investigating options regarding condition assessment of the vertical assets.

6.1.3 Estimated Useful Life and Average Age

The Estimated Useful Life for Wastewater Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

It is worth noting that the assessed condition (CCTV) of sewermains (<300mm) is relatively better than the calculated age-based condition. Therefore, the Average Service Life Remaining was extended for these assets.

Asset Segment	Asset Sub-Segment	Estimated Useful Life (Years)	Average Asset Age (Years)	Average Service Life Remaining (Years)
Wastewater Linear Network	Forcemains	75 Years	41.6	34.8
Wastewater Linear Network	Sewermains (<200mm)	75 Years	25.8	49.1
Wastewater Linear Network	Sewermains (200-300mm)	75 Years	39.6	54.3
Wastewater Linear Network	Sewermains (>300mm)	75 Years	39.1	53.6
Wastewater Vertical Network	Pumping Stations	5-75 Years	24.9	12.7
Wastewater Vertical Network	Wastewater Treatment Centre	5-75 Years	16.1	16.6
			37.1	**49.4**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

6.1.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

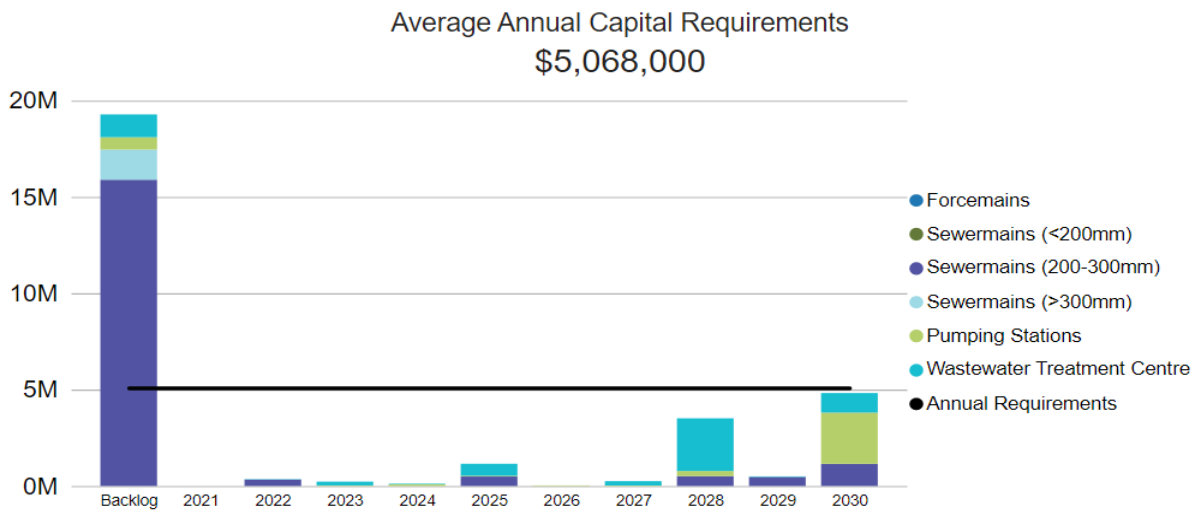
The following table outlines the City's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance[14]	The City's annual maintenance program includes: • Sewermain flushing, rodding, and inspections • Regular maintenance activities are conducted on the vertical assets through a work order system in accordance with manufacturers' recommendations (typically annually or as needed)
Rehabilitation/ Replacement	Trenchless re-lining of sewer mains has been used historically but is currently suspended as staff are evaluating high priority mains that do not align with current road reconstruction plans.
	Sewer main reconstruction, similar to other sub-surface infrastructure, is aligned with road reconstruction planning. When a sewer main is considered a high priority for replacement/rehabilitation, but does not align with road reconstructions plans, trenchless re-lining may be a feasible option.
	Vertical assets, such as sewage pumps, grinders and flow meters, that have reached end of life are either refurbished every five to ten years or are replaced based on their life cycle or Master Plan recommendations.

Forecasted Capital Requirements

Rehabilitation and replacement needs are generated across the entire design life of each asset. The following graph identifies capital requirements over the next 10 years only. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.

[14] Maintenance activities are an operational expense, not a capital expense.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

6.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure. The metrics that have been used to determine both can be found in Appendix C.

1 - 3	4 - 5	6 - 7	8 - 9	10 - 10
570 Assets	1,592 Assets	356 Assets	222 Assets	0 Assets
31,798.33 unit(s), m	99,152.48 unit(s), m	19,366.51 unit(s), m	20,797.18 unit(s), m	-
$55,293,845.51	$172,291,103.91	$53,015,873.96	$42,349,313.37	$0.00

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

	Climate Change & Extreme Weather Events
	Significant inflow & infiltration (I & I) is challenging the plant and pumping stations as the events are exceeding the design capacity of the system. Storm events can cause a power outage as well as overwhelm the system's capacity due to I&I.

	**Lifecycle Management Strategies** For linear infrastructure, staff are in the process of reviewing a re-lining program. However, it is uncertain how long re-lining will last and whether there is consistency in methodology and materials between the various contractors who conduct this work. CCTV inspections are a key process that should be included. In terms of vertical infrastructure, there is a need for a refurbishment plan for pumps as they are in a harsh environment and expensive to replace. Furthermore, more pumps stations may need standby generators to operate during extreme weather events.
	**Infrastructure Re-investment** The reinvestment in infrastructure has been very reactive. Rehabilitation budgets have not increased in proportion to the age of the infrastructure.

6.1.6 Levels of Service

The following tables identify the City's current level of service for the Wastewater Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Wastewater Network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	Appendix B

Service Attribute	Qualitative Description	Current LOS (2020)
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	No combined sewers
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	No combined sewers
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter the municipal system through improperly connected roof drains, damaged or deteriorated manhole lids, frames and chimneys, and through the pick holes in depressed manholes.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	Manholes are typically installed to be at grade and not in depressed areas
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent discharged from the Wastewater Treatment Centre conforms with the following standards: • TP – annual average limit is 0.1 mg/L and 996 kg/yr; Monthly average limit = 0.18 mg/L • CBOD5 – limit is 15 mg/L • TSS – limit is 15 mg/L • E.Coli – limit is 200 CFU/100 mL • pH – 6.0-9.5 inclusive Total Ammonia Nitrogen – no limit, but effluent objective is 13 mg/L (June 1 – Oct. 31) and 17 mg/L (Nov. 1 – May 31)

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Wastewater Network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	95%
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	0
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0.00052
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0
Performance	Capital re-investment rate	1.34%

6.1.7 Recommendations

Asset Inventory

- Develop a more detailed breakdown of the assets within the Wastewater Network, including manholes.

Condition Assessment Strategies

- It is critical to continue the CCTV inspections of the wastewater network to enhance the accuracy of the condition assessment and to gather up to date condition ratings.
- Develop a condition assessment program for vertical Wastewater Network assets.

Risk Management Strategies

- Continue to implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.

Lifecycle Management Strategies

- Evaluate the efficacy of the City's lifecycle management strategies at regular intervals to determine the impact cost, condition, and risk.
- Implement a flow monitoring program to address concerns with inflow & infiltration
- Consider performing manhole inspections, as well as lining and grouting

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the City has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

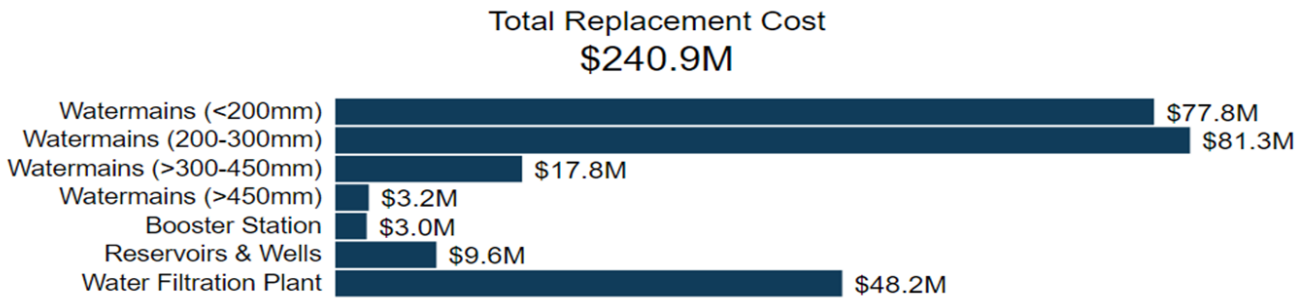
6.2 Water Network

The water services provided by the City include drinking water treatment and distribution, water meter installation, cross-connection and backflow prevention, service connections, fire hydrants and watermain breaks.

6.2.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the City's Water Network inventory.

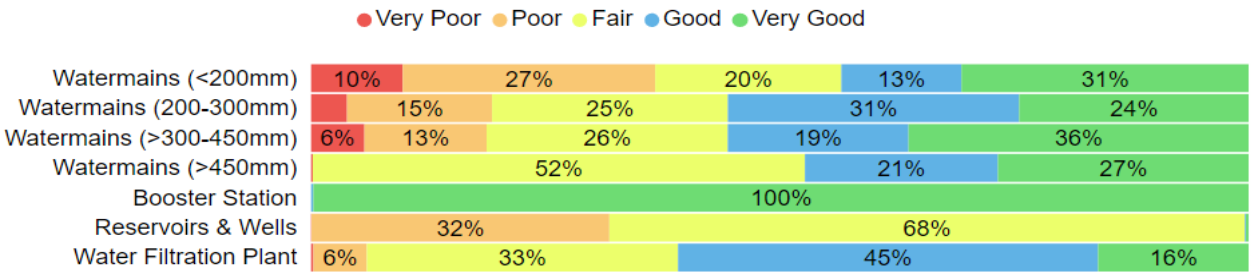
Asset Segment	Asset Sub-Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Water Linear Network	Watermains (<200mm)	79,263m	Cost/Unit	$77,836,266
Water Linear Network	Watermains (200-300mm)	82,744m	Cost/Unit	$81,254,608
Water Linear Network	Watermains (>300-450mm)	18,106m	Cost/Unit	$17,780,092
Water Linear Network	Watermains (>450mm)	3,273m	Cost/Unit	$3,214,086
Water Vertical Network	Booster Station	1	User-Defined Cost	$3,006,000
Water Vertical Network	Reservoirs & Wells	3	User-Defined Cost	$9,635,000
Water Vertical Network	Water Filtration Plant	1	User-Defined Cost	$48,193,050
				$240,919,102



6.2.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Asset Sub-Segment	Average Condition (1-5)	Average Condition Rating	Condition Source
Water Linear Network	Watermains (<200mm)	3.1	Fair	Age-Based
Water Linear Network	Watermains (200-300mm)	3.0	Fair	Age-Based
Water Linear Network	Watermains (>300-450mm)	3.0	Fair	Age-Based
Water Linear Network	Watermains (>450mm)	3.0	Fair	Age-Based
Water Vertical Network	Booster Station	1.3	Very Good	Staff Assessment 2020
Water Vertical Network	Reservoirs & Wells	3.2	Fair	Staff Assessment 2020
Water Vertical Network	Water Filtration Plant	2.6	Good	Ainley and Associates - WFP Condition Assessment and Staff Assessment 2020
		3.0	**Fair**	



To ensure that the City's Water Network continues to provide the current level of service, the City should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Water Network.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. Currently, asset condition is not formally reviewed and recorded. The condition assessment is limited to a desktop assessment[15]. There are inherent challenges with completing condition assessments for active watermains, as the condition assessment generally requires in-pipe equipment, and significant staff and financial resources. In the absence of condition assessments an age-based assessment is used to predict current condition.

It is recommended to implement an Operations program to complete condition assessment for critical watermains (400mm and greater) on a regular basis (e.g., five years) to have a better understanding of the condition for these mains.

6.2.3 Estimated Useful Life & Average Age

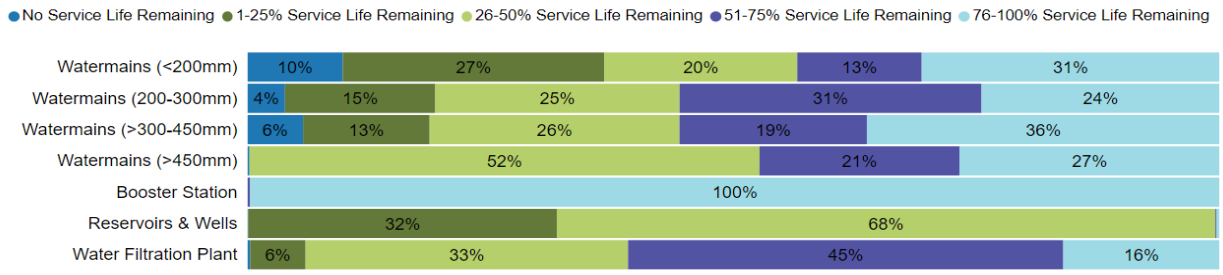
The Estimated Useful Life for Water Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

It is worth noting that the Water Vertical Network has assets ranging from one year to 100 years in terms of Estimated Useful Life. The Average Estimated Useful Life for the aforementioned asset segment is around 41 years. In this specific case, the assessed condition

[15] The desktop assessment utilizes age only.

of Water Vertical Network assets is relatively better than the calculated age-based condition. Therefore, the Average Service Life Remaining was extended.

Asset Segment	Asset Sub-Segment	Estimated Useful Life (Years)	Average Asset Age (Years)	Average Service Life Remaining (Years)
Water Linear Network	Watermains (<200mm)	75 Years	39.6	35.9
Water Linear Network	Watermains (200-300mm)	75 Years	36.2	39.9
Water Linear Network	Watermains (>300-450mm)	75 Years	35.8	40.8
Water Linear Network	Watermains (>450mm)	75 Years	42.2	37.1
Water Vertical Network	Booster Station	1-100 Years	4.0	35.8
Water Vertical Network	Reservoirs & Wells	1-100 Years	14.7	14.7
Water Vertical Network	Water Filtration Plant	1-100 Years	21.8	26.8
			33.4	**35.3**



Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

6.2.4 Lifecycle Management Strategy

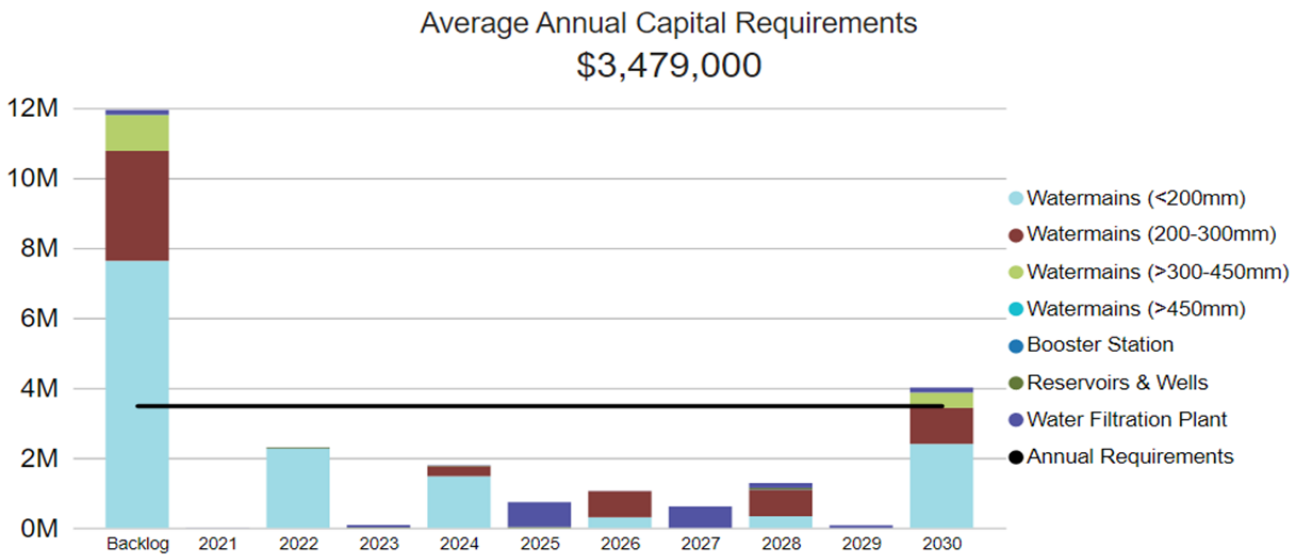
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following table outlines the City's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	The City's current annual maintenance program includes: • valve exercising • watermain flushing • hydrant inspections • air relief valve and chamber inspections • maintenance on vertical assets in accordance with the City's CMMS
Rehabilitation/ Replacement	Trenchless re-lining has been completed in the past where there is an opportunity to reduce the impact of open cut excavation (e.g. highway crossings), but re-lining is relatively uncommon for watermains.
	Reconstruction efforts have focused on older watermains and rely on an age-based assessment of current condition.
	Similar to other sub-surface infrastructure staff attempt to coordinate water reconstruction projects with road reconstruction projects to produce cost efficiencies.
	The strategy for Water Vertical assets is end of life replacement.

Forecasted Capital Requirements

Rehabilitation and replacement needs are generated across the entire design life of each asset. The following graph identifies capital requirements over the next 10 years only. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.

The City has a significant backlog due to having more than $10.7 million dollars worth of replacements associated to watermains (<300mm) that are in very poor condition. The investment required in every following year is reflective of the replacement value of assets reaching the end of their respective service life. Assessed condition data would generate a better representation of the replacement needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

6.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the level of risk exposure for this asset category. It considers both the probability of failure and consequence of failure. The metrics that have been used to determine both can be found in Appendix C.

1 - 3	4 - 5	6 - 7	8 - 9	10 - 10
499 Assets	569 Assets	419 Assets	210 Assets	7 Assets
48,814.00 unit(s), m	56,215.00 unit(s), m	54,920.00 unit(s), m	23,970.00 unit(s), m	11.00 unit(s), m
$50,980,446.00	$84,949,432.00	$72,716,730.00	$31,662,674.00	$609,820.00

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the City is currently facing:

	**Climate Change & Extreme Weather Events**
	Risks, including those as a result of climate change, are considered as part of the Drinking Water Quality Management Standard. Risks to the water infrastructure are reviewed, assessed, and evaluated for mitigation as a part of the Drinking Water Quality Management Standard process.
	**Lifecycle Management Strategies**
	The City's network of watermains is comprised of several different pipe materials. Some materials have higher break rates and present more operational challenges. In recent years there has been a focus on replacing cast iron, ductile iron, and asbestos cement pipes with PVC. Reconstruction is usually tied to road reconstruction, which may represent a concern. The maintenance practice for vertical assets has generally been reactive. The City wants to implement more preventative and predictive maintenance programs in the future. The City is facing some challenges with Programmable Logic Controllers, some parts have already become obsolete.
	**Infrastructure Re-investment**
	The reinvestment in infrastructure has been very reactive. Rehabilitation budgets have not increased in proportion to age of infrastructure. There has been some moderate shift to proactive reinvestment in the recent period.

6.2.6 Levels of Service

The following tables identify the City's current level of service for the Water Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the City has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Water Network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix B
Reliability	Description of boil water advisories and service interruptions	See Appendix B

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Water Network.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal water system	95%
	% of properties where fire flow is available	98%
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0.00026
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0
Performance	Capital re-investment rate	2.02%

6.2.7 Recommendations

Asset Inventory

- Develop a more detailed breakdown of the assets within the water distribution network.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets.
- Enhance the current approach to condition assessment to incorporate additional asset data as if becomes available, for example, using watermain break and/or leak detection information.
- In time, explore industry best practices to develop a better condition assessment strategy for the distribution network.

Risk Management Strategies

- Continue to implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.

- Implement an operations program to complete condition assessment for critical watermains (400mm and larger) on a regular basis (e.g., every 5 years) to have a better understanding of the condition for these mains.
- Review risk models on a regular basis and adjust according to the availability of new data and also an evolving understanding of the probability and consequences of asset failure.

Lifecycle Strategies

- Evaluate the efficacy of the City's lifecycle management strategies at regular intervals to determine the impact of cost, condition, and risk.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the City has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

7 Impacts of Growth

7.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the City to plan for new infrastructure more effectively, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

7.1.1 City of Orillia Strategic Plan (January 2020)

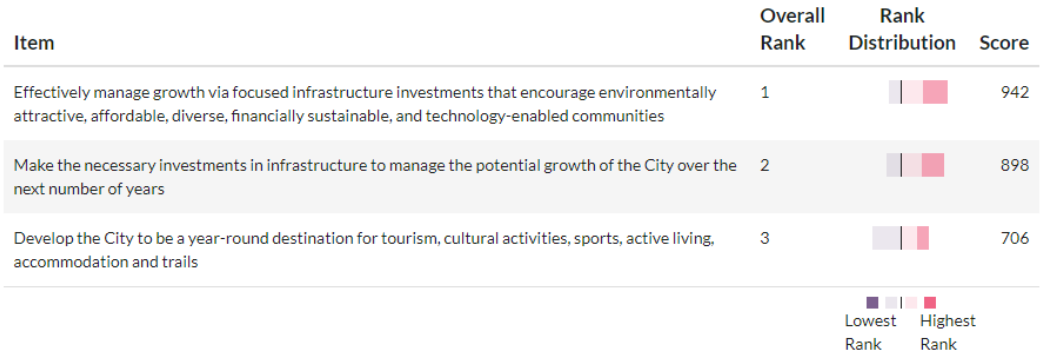
In 2020, the City released its Strategic Plan to serve as a roadmap and set the stage for decision making and priority setting for Orillia over the next several years. The Strategic Plan is founded on six themes, that were identified as important areas of focus during stakeholder engagement sessions with Council and senior staff. “Sustainable Growth” was identified as one of the six themes that are key to achieving the City’s vision and mission.

The objective of sustainable growth is to ensure that the unique attributes and the sense of community are maintained as the City grows. It is also intended to ensure that the financial, infrastructure, and natural resources of the City are managed responsibly and that the City’s growth does not place an undue burden on its residents. By focusing on sustainable growth, it is intended that that the City will create diversified growth from which the community as a whole benefits.

The following strategic goals are intended to ensure that the aforementioned sustainable growth objective is met:

1. **Manage growth to accommodate 41,000 residents and 21,000 employment opportunities by 2031[16].** These growth targets relate to the Province's Growth Plan, *Growth Plan for the Greater Golden Horseshoe, 2019* and the City's Official Plan, *City of Orillia Official Plan, 2010*. The goal is to ensure the City accommodates this anticipated growth through adequate planning principles. Additionally, it is intended that the City's growth is undertaken within a financial framework, as well as an asset management framework to ensure the long-term sustainability.
2. **Develop the City to be a year-round destination for tourism, cultural activities, sports, active living, accommodation, and trails.** This will both impact tourism and City residents. Regarding tourism, more year-round visitation will help to minimize the effect of seasonality on local businesses, and from a resident perspective, it will make the City more liveable and exciting year-round.
3. **Effectively manage growth via focused infrastructure investments that encourage environmentally attractive, affordable, diverse, financially sustainable and technology-enabled communities.** This goal expands on the first strategic goal and focuses on specific concerns around affordability, diversity and the environment. By ensuring future investments are aligned with these items will ensure that growth will be aligned with community priorities.
4. **Promote economic development to create employment investment opportunities.** This will help attract investment and create increased economic opportunity. Economic development was a significant concern raised in staff and public consultations and relates to concerns regarding low household income levels.

Furthermore, according to a Stakeholder Consultation Survey, the third strategic goal was the highest ranked goal. Although not ranked first, infrastructure investments to manage potential growth of the City (the first strategic goal) was a strong second as seen below.



[16] Density targets in the Growth Plan have changed since the Strategic Plan was adopted. The City's Official Plan has not yet been updated to reflect these new figures. The 2051 targets are 49,000 residents and 26,000 employment opportunities by 2051.

7.1.2 The City of Orillia Official Plan (March 2010)

In 2010, the City of Orillia adopted a new Official Plan[17] to establish a vision for the future urban structure of the City. The plan serves as a primary tool to direct the actions of the City, while shaping future growth and managing the change to the year 2031.

The vision of the plan is to maintain Orillia's unique character and strong civic identity, while guiding growth and development in a manner that creates a safe, healthy, attractive, and livable community. The plan presents four guiding principles to help the City in the achievement of the vision:

- Manage growth in a responsible and efficient manner
- Promote a complete community that supports a healthy, safe, and diverse population
- Ensure the sustainability and integrity of the environment
- Promote a strong and diverse employment base

The City's Official Plan currently indicates that the City is anticipated to accommodate a population of 41,000 people and 21,000 jobs by the year 2031. The Official Plan has not yet been brought into compliance with the August, 2020, update to the Growth Plan for the Greater Golden Horseshoe which extended the horizon for land use planning to 2051 and which requires that the City accommodate 49,000 people and 26,000 jobs by 2051. The Official Plan directs that population growth would be directed to the Neighbourhood Greenfield designation as shown on Schedule A – Land Use (Figure 1 below) and within the City's existing built boundary. The province now requires that 50% of this population growth must be within the City's existing Built Up Area (Figure 2 below), whereas previously the target for intensification within the Built Up Area was 40%.

The City is currently in the process of updating its Official Plan through a Municipal Comprehensive Review. As a part of this process, a Land Needs Assessment has been completed which has concluded that the City requires an additional 120 ha of Community Area (being area focused around housing and the local employment, infrastructure, and services necessary to sustain residential areas) and an additional 56.5 ha of Employment Area (being area focused around land for the exclusive use of employment activity, generally found in business parks and industrial areas) in order to meet the density targets as specified in the updated Growth Plan for the Greater Golden Horseshoe. The Municipal Comprehensive Review

[17] The Official Plan was adopted by Council on March 9, 2010. The unappealed portions were approved by the Ministry of Municipal Affairs and Housing on March 17, 2011 and the entire plan was approved by the Ontario Municipal Board on August 23, 2013. The most recent consolidation of the Official Plan is dated February 9, 2021.

is anticipated to take several years, following which the City's Official Plan will be updated to reflect the new density targets.

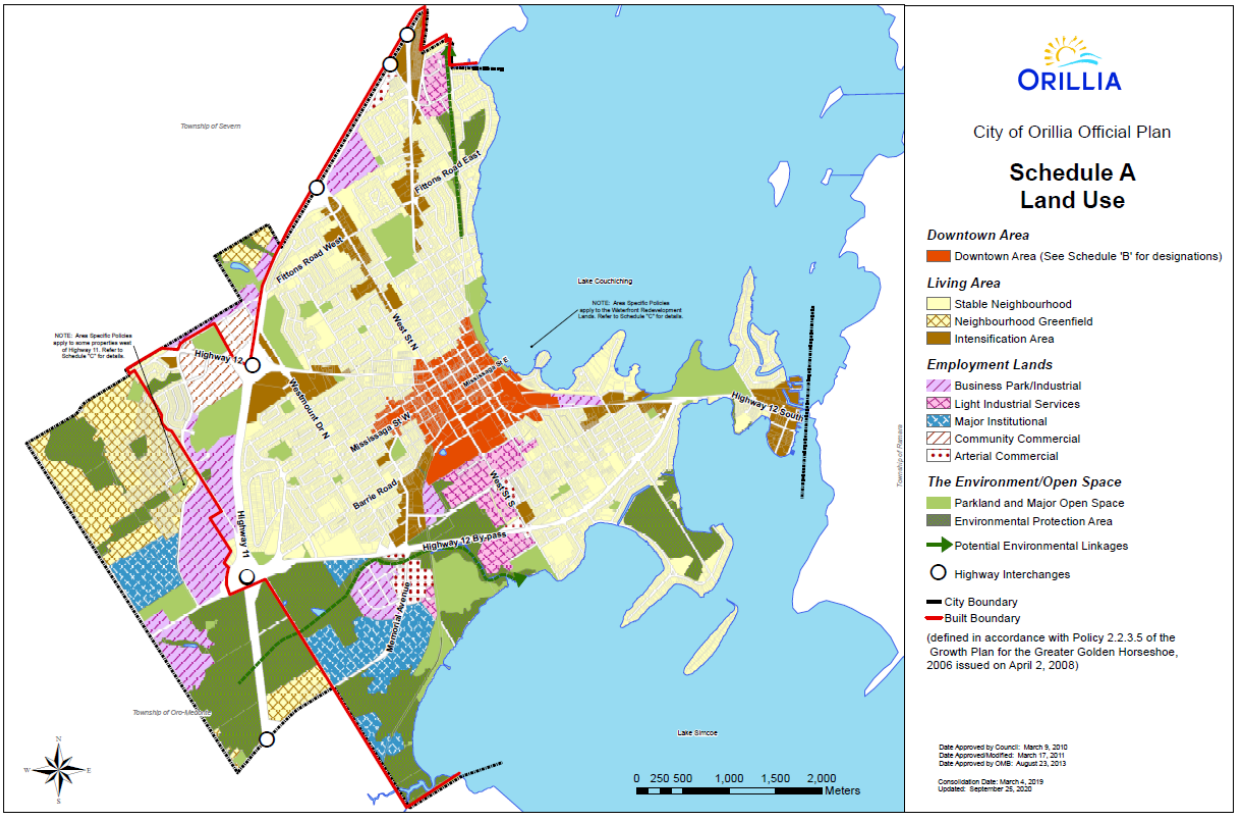


Figure 1 Schedule A - Land Use

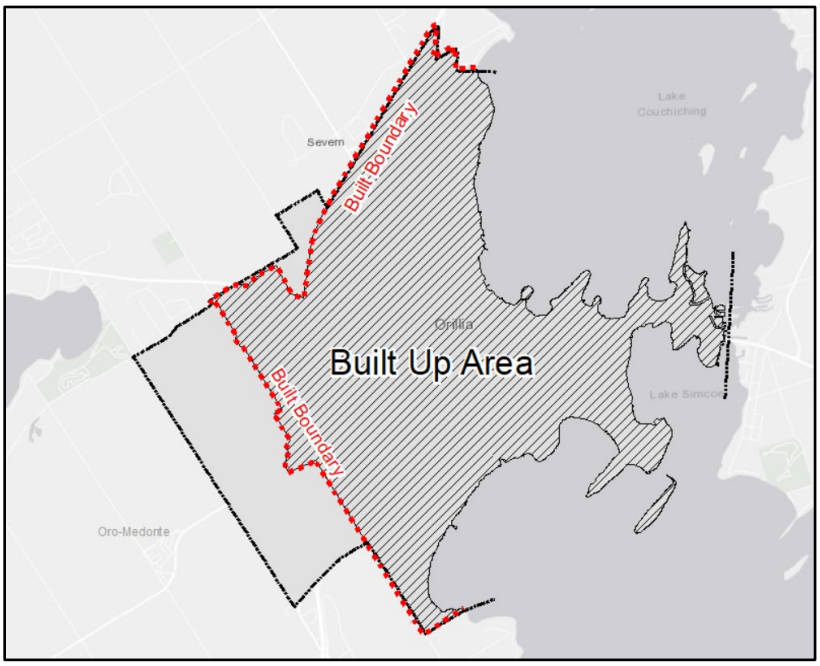


Figure 2 Orillia's Existing Built Up Area

According to the plan, the City is required to maintain at all times the ability to accommodate residential growth for a minimum of 10 years through residential intensification and redevelopment and lands which are designated and available for residential development. All developments are to be reviewed according to a sustainability framework.

In terms of economic development, the City is responsible to supply, maintain, and enhance adequately serviced employment lands. Furthermore, the promotion and encouragement of waterfront-related facilities is proposed to enhance the tourism potential of the waterfront, Downtown area, and adjacent residential neighbourhoods.

7.2 Impact of Growth on Lifecycle Activities

Planning for forecasted population growth will require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the City's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the City will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

The following tables provide a 10-year forecast of the growth-related projects. The forecast includes the estimated capital expenditures and significant operating costs related to the lifecycle activities required to maintain the current levels of service in order to accommodate projected increases in demand caused by growth, including estimated capital expenditures and significant operating costs related to new construction or to upgrading of existing municipal infrastructure assets.

		Year	Roads	Water	Wastewater	Storm	Bridges & Culverts	Annual Totals
Capital Costs	Constructed Infrastructure	**2021**	$732,260	$2,875,100	$674,860	$787,610	$0	**$5,069,830**
		2022	$0	$1,500,000	$0	$1,450,000	$0	**$2,950,000**
		2023	$1,303,780	$6,354,340	$2,349,760	$1,036,585	$1,694,400	**$12,738,865**
		2024	$0	$240,000	$0	$1,926,000	$0	**$2,166,000**
		2025	$0	$0	$0	$3,834,000	$0	**$3,834,000**
		2026	$0	$1,750,000	$1,800,000	$2,282,000	$0	**$5,832,000**
		2027	$0	$0	$0	$520,000	$0	**$520,000**
		2028	$0	$0	$0	$350,000	$0	**$350,000**
		2029	$0	$0	$0	$0	$0	**$0**
		2030	$0	$0	$0	$0	$0	**$0**
		Total Constructed	**$2,036,040**	**$12,719,440**	**$4,824,620**	**$12,186,195**	**$1,694,400**	**$33,460,695**
	Assumed Infrastructure	**2021**	$0	$0	$0	$0	$0	**$0**
		2022	$0	$0	$0	$0	$0	**$0**
		2023	$821,560	$451,720	$757,160	$883,660	$0	**$2,914,100**
		2024	$0	$0	$0	$0	$0	**$0**
		2025	$0	$0	$0	$0	$0	**$0**
		2026	$0	$0	$0	$0	$0	**$0**
		2027	$0	$0	$0	$0	$0	**$0**
		2028	$11,780,456	$6,477,272	$11,357,016	$13,231,055	$0	**$42,845,799**
		2029	$0	$0	$0	$0	$0	**$0**
		2030	$767,980	$422,260	$707,780	$826,030	$0	**$2,724,050**
		Total Assumed	**$13,369,996**	**$7,351,252**	**$12,821,956**	**$14,940,745**	**$0**	**$48,483,949**
		Total	**$15,406,036**	**$20,070,692**	**$17,646,576**	**$27,126,940**	**$1,694,400**	**$81,944,644**

	Year	Roads	Water	Wastewater	Storm	Bridges & Culverts	Annual Totals
Significant Operating Costs	**2021**	$36,613	$143,755	$33,743	$39,381	$0	**$253,492**
	2022	$36,613	$218,755	$33,743	$111,881	$0	**$400,992**
	2023	$142,880	$559,058	$189,089	$207,893	$84,720	**$1,183,640**
	2024	$142,880	$571,058	$189,089	$304,193	$84,720	**$1,291,940**
	2025	$142,880	$571,058	$189,089	$495,893	$84,720	**$1,483,640**
	2026	$142,880	$658,558	$279,089	$609,993	$84,720	**$1,775,240**
	2027	$142,880	$658,558	$279,089	$635,993	$84,720	**$1,801,240**
	2028	$731,903	$982,422	$846,940	$1,315,046	$84,720	**$3,961,030**
	2029	$731,903	$982,422	$846,940	$1,315,046	$84,720	**$3,961,030**
	2030	$770,302	$1,003,535	$882,329	$1,356,347	$84,720	**$4,097,232**
	Total	**$3,792,035**	**$7,352,712**	**$4,651,468**	**$7,748,010**	**$762,480**	**$24,306,706**

Taking into consideration future infrastructure demand it is estimated that the capital annual requirements required to fund the infrastructure program will increase by $3.3 million over the span of the next 10 years.

8 Financial Strategy

8.1 Financial Strategy Overview

For an AMP to be effective and meaningful, it must be integrated with a long-term financial plan (LTFP)[18]. The development of a comprehensive LTFP plan will allow the City of Orillia to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

This report serves as a starting point for initial financial planning, specific for existing capital assets, by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following.

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels (out of scope for this plan, will be included in the 2025 plan)
    d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves

[18] At this time the City has not adopted a long-term financial plan. Long term financial plans (LTFP) are a framework of tools for Councils and staff toconsider future financial challenges and opportunities through financial forecasting scenarios, analysis, and financial policies and to devise strategies to achieve financial sustainability. A LTFP is the process of projecting revenues and expenditures over a long-term period while using assumptions relevant to the municipality. In essence, Long-term financial planning is the process of aligning financial capacity with long-term service objectives and the city's strategic plans, as noted in the literature from the Government Financial Officers Association (GFOA). The capital budget could be used to perform the infrastructure funding gap analysis in the LTFP.

    d. Debt
    e. Development charges
3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

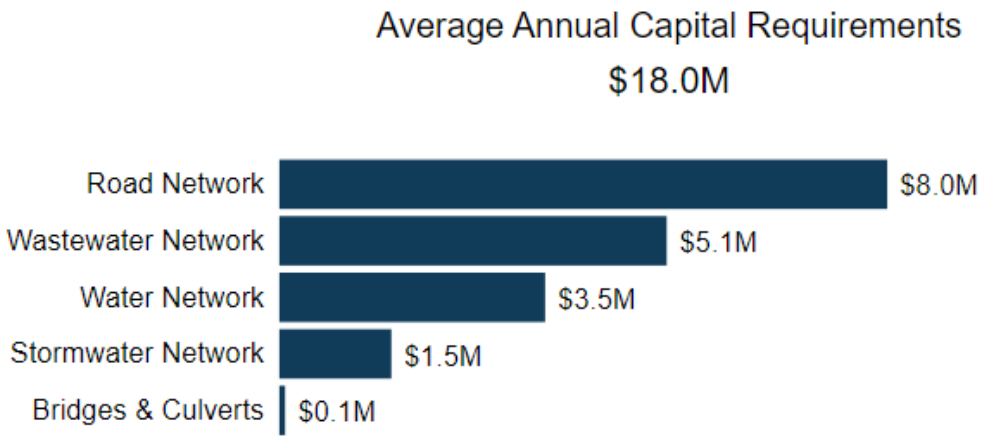
If the financial plan component results in a funding shortfall, the Province requires, by July 1, 2024, the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a City's approach to the following:

1. In order to reduce financial requirements, consideration has been given to revising service levels downward.
2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.
    b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

8.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the City should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the City must allocate approximately $18.0 million annually to address capital expenditures (CapEx) for the core assets included in this AMP.



For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which CapEx are only incurred at the construction and replacement of each asset.

However, for the Road Network and Bridges and Culverts, lifecycle management strategies have been developed to identify CapEx that are realized through strategic rehabilitation and renewal of the City's roads and Bridges and Culverts respectively. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented. The following table compares two scenarios for the Road Network and Bridges and Culverts:

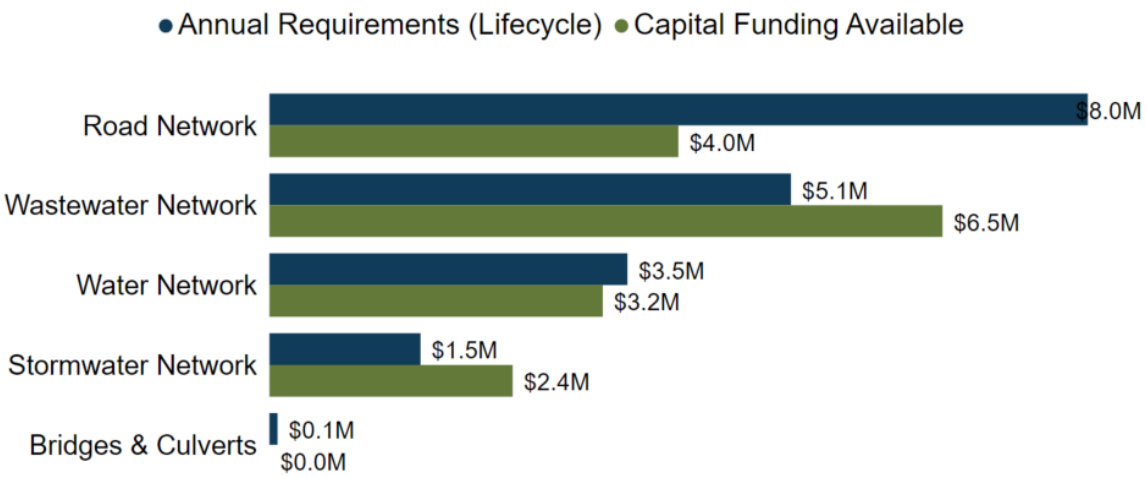
1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Bridges and Culverts	$45,000	$80,000	$(35,000)
Road Network	$13,367,000	$7,951,000	$5,416,000
Stormwater Network	$1,469,000	$1,469,000	$0
Wastewater Network	$5,068,000	$5,068,000	$0
Water Network	$3,479,000	$3,479,000	$0

The implementation of a proactive lifecycle strategy for the Road Network leads to a potential annual cost avoidance of $5.4 million. This represents an overall reduction of the annual requirements for the Road Network category by about 40%. As the lifecycle strategy scenario represents the lowest cost option available to the City, we have used these annual requirements in the development of the financial strategy. For the case of Bridges and Culverts assets, further refinement to the data quality in both the inventory and lifecycle strategy is required to generate more accurate annual requirements.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the City is committing approximately $16.1 million towards core assets capital projects per year. Given the annual CapEx of $18.0 million, there is currently a funding gap of $1.9 million annually.



The low level of data maturity, especially for the Stormwater Network, is believed to cause an underestimation for the annual capital requirements. The City is working on refining the data in order to increase the level of accuracy of such estimates. The recent expansion of the Water Filtration Plant (Water Network) and growth-related investments in the Stormwater Network have inflated the capital funding available for the aforementioned asset categories. Proactive investment in asset growth is a good practice in asset management, resulting in spreading the financial burden associated with these investments over multiple generations.

8.2 Funding Objective

We have developed a scenario that would enable Orillia to achieve full funding within 1 to 20 years for the following assets:

1. **Tax Funded Assets:** Road Network, Stormwater Network[19], Bridges and Culverts
2. **Rate-Funded Assets:** Water Network, Wastewater Network

For each scenario developed we have included strategies, where applicable, regarding the use of cost containment and funding opportunities.

[19] The Stormwater Network is partly funded by User Fees, Provincial Funding and Tax Levy. It has been placed with the tax-funded assets as taxes represent the biggest portion of funding available for the Stormwater Network in this AMP.

8.3 Profile: Tax Funded Assets

8.3.1 Current Funding Position

The following tables show, by asset category, Orillia's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available						Annual Deficit / (Surplus)
		Taxes[20]	Gas Tax	OCIF	Stormwater Rates	Taxes To Reserves	Total Available	
Road Network	$7,951,000	$225,000	$1,977,000	$480,000	$0	$1,292,000	$3,974,000	$3,977,000
Stormwater Network	$1,469,000	$0	$0	$1,271,000	$89,000	$1,004,000	$2,364,000	$(895,000)
Bridges and Culverts	$80,000	$0	$0	$0	$0	$0	$0	$80,000
	$9,500,000	**$225,000**	**$1,977,000**	**$1,751,000**	**$89,000**	**$2,296,000**	**$6,338,000**	**$3,162,000**

The average annual investment requirement for the above categories is $9.5 million. Annual revenue currently allocated to these assets for capital purposes is $6.3 million leaving an annual deficit of $3.2 million. Put differently, these infrastructure categories are currently funded at 67% of their long-term requirements. However, these numbers are reflective of the available data. According to the current analysis, some assets are over funded. This could be due to including the amounts allocated to future projects in in the total available funding and/or underestimating the annual capital requirements due to the incompleteness of the asset inventory data. Further enhancement efforts that will be applied to the data quality will result in changes to the analysis.

8.3.2 Full Funding Requirements

In 2021, City of Orillia has budgeted annual tax revenues of $63.7 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time: It is worth noting that the numbers below are reflective of the current data quality. Further enhancements of the data quality would increase the accuracy of the following numbers.

[20]The tax allocation presented in the table is based on a historical analysis of the figures provided by the City. However, it is worth noting that the apportionment of taxes to capital projects is subject to fluctuation over the years.

Asset Category	Tax Change Required for Full Funding
Road Network	6.2%
Stormwater Network	-1.4%
Bridges and Culverts	0.1%
	5%

Again, according to the current analysis, some assets are over funded. This could be due to including the amounts allocated to future projects in in the total available funding and/or underestimating the annual capital requirements due to the incompleteness of the asset inventory data.

In the following table, we have expanded the above scenario to present multiple options. These options include different timespans to close the infrastructure gap as seen below.

	Time Required to Close the Infrastructure Gap			
	5 Years	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	$3,162,000	$3,162,000	$3,162,000	$3,162,000
Change in Debt Costs	N/A	N/A	N/A	N/A
Change in OCIF Grants	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit:	**$3,162,000**	**$3,162,000**	**$3,162,000**	**$3,162,000**
Tax Increase Required	5%	5%	5%	5%
Annually:	**1%**	**0.5%**	**0.33%**	**0.25%**

8.3.3 Financial Strategy Recommendations

Considering all the above information, we recommend the 5-year option. This involves full funding being achieved over 5 years by:

a) Maintaining the debt load and loan repayment for the existing infrastructure;
b) increasing tax revenues dedicated to core CapEx by approx. 1% each year for the next 5 years solely for the purpose of phasing in full funding to the asset categories covered in this AMP;
c) allocating the government transfer revenues for capital assets as outlined previously; and
d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to deficit phase-in;

Notes:

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. Based on best practices, this periodic funding should not be incorporated into an AMP unless there are firm commitments in place. We have included the government transfer funding, as provided by the Finance Division.[21]
- We realize that raising tax revenues by the amounts recommended above for infrastructure purposes may be challenging. However, a lack of intentional asset funding planning today may have even greater consequences in terms of infrastructure failure. Although this option achieves full funding on an annual basis in 5 years and provides financial sustainability over the period modeled, the recommendations do require re-prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment (backlog) demand of $16 million for the Road Network, and $6.1 million for the Stormwater Network.
- Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

[21] The City should take advantage of all available grant funding programs and transfers from other levels of government. The financial strategy within this AMP has only included the known capital funding as provided by the City's Finance Division and there is an expectation the City should be eligible for additional capital funding from senior governments within the next twenty years that could reduce the tax burden.

8.4 Financial Profile: Rate Funded Assets

8.4.1 Current Funding Position

The following tables show, by asset category, Orillia's average annual CapEx requirements, current rate funding positions[22], funding increases required and the annual deficit across the rate funded utilities.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit / (Surplus)
		Rates	To Oper	OCIF	Total Available	
Water Network	$3,479,000	$7,545,000	$(4,305,000)	$0	$3,240,000	$239,000
Wastewater Network	$5,068,000	$9,365,000	$(2,826,000)	$0	$6,539,999	$(1,471,000)
	$8,547,000	**$16,910,000**	**$(7,131,000)**	**$0**	**$9,779,000**	**$(1,232,000)**

The average annual CapEx for the above categories is $8.5 million. Annual rate revenues currently allocated to these assets for capital purposes is $9.8 million leaving an annual surplus for both utilities of $1.2 million. The Water Network is substantially funding its long-term requirements, while the Wastewater Network is fully funding its long-term requirements. However, these numbers are reflective of the available data. Further enhancement efforts that will be applied to the data quality will result in changes to the analysis.

8.4.2 Full Funding Requirements

In 2021, Orillia had annual budgeted Wastewater revenues of $9.4 million and annual budgeted water revenues of $7.5 million. As illustrated in the table below, without consideration of any other sources of revenue, full funding for the Water Network would require the following changes over time: It is worth noting that the numbers below are reflective of the current data quality. Further enhancements of the data quality would increase the accuracy of the following numbers.

Asset Category	Rate Change Required for Full Funding
Water Network	3.2%
Wastewater Network	No Increase Required

In the following table, we have expanded the above scenario to present multiple options. Due to the significant increases required, we have provided phase-in options of up to 20 years:

[22] The annual rate funding excludes other taxes and government transfer revenues applied to utilities.

	Water Network				Wastewater Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit (Surplus)	$239,000	$239,000	$239,000	$239,000	$(1,471,000)	$(1,471,000)	$(1,471,000)	$(1,471,000)
Rate Increase Required	3.2%	3.2%	3.2%	3.2%	No Increase Required			
Annually:	**0.6%**	**0.3%**	**0.2%**	**0.2%**				

8.4.3 Financial Strategy Recommendations

Considering all the above information, we recommend maintaining the current status quo funding model for the Water Network and the Wastewater Network rate funded assets. This is based on the City's infrastructure surplus currently showing as fully funded. The City's Water Network has a deficit of $239,000 while the Wastewater Network is fully funded. The City is well positioned to maintain fully funded infrastructure for both utilities by:

a) Maintaining the current rates (i.e. no rate increase recommended at this time) and revenue allocations for CapEx purposes, for Water and Wastewater Networks each year for the next twenty years;
b) The Wastewater Network is fully funded and the Water Network is trending towards being fully funded as covered in this section of the AMP.
c) Increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- We acknowledge that raising rate revenues consistently for the next twenty years to invest in infrastructure purposes is **not** necessary, especially for both the City's utilities given the state of infrastructure and current funding levels.
- We also recognize the City has had a reasonable funding strategy for the utility infrastructure, and the data suggests the City has a successful approach to asset management, CapEx investments and financing of the utility's capital assets. Therefore, no rate increases are needed at all for existing utility infrastructure.
- Assumption is that no new debt will be taken on to pay for existing infrastructure.
- We recognize the City may also have other Utility related revenues in addition to the rates, such as other charges and government transfer revenues.
- It is reasonable to propose that periodic senior government infrastructure funding should be available during the period analyzed. However, this periodic funding has not been incorporated into an AMP unless there are firm commitments in place.
- Also, the City could choose to implement a potential rate increase at any time during the next twenty years for one of the following reasons: new technical information/data amends the infrastructure investment requirement, and/or the City wishes to fund specific Water or Sewer Capital Reserves for future infrastructure needs.

- Any increase in rates required for future operations would be in addition to the above recommendations.
- This option maintains the annual rates for both Utilities and provides financial sustainability over the period modeled. The recommendations do require re-prioritizing capital projects to fit the resulting annual funding available. It is important to be mindful of the changes to the state of infrastructure and financials during the next twenty years. Today, the City is well prepared to fund the current Water and Wastewater infrastructure requirements because the current annual funding plan is sufficient over the next twenty years.

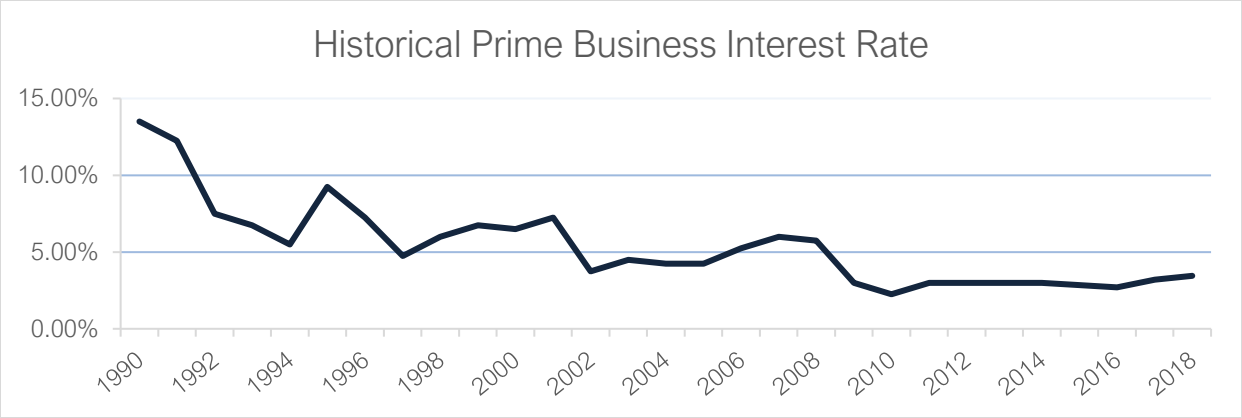
8.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1 million project financed at 3.0%[23] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

Interest Rate	Number of Years Financed					
	5	10	15	20	25	30
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%
2.5%	8%	14%	21%	28%	36%	43%
2.0%	6%	11%	17%	22%	28%	34%
1.5%	5%	8%	12%	16%	21%	25%
1.0%	3%	6%	8%	11%	14%	16%
0.5%	2%	3%	4%	5%	7%	8%
0.0%	0%	0%	0%	0%	0%	0%

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:

[23] The current (2021) municipal Infrastructure Ontario rate for 15-year financing is 3.2%.



A change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

The revenue options outlined in this plan allow Orillia to fully fund its long-term infrastructure requirements without further use of debt.

8.6 Use of Reserves

8.6.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

a) the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
b) financing one-time or short-term investments
c) accumulating the funding for significant future CapEx
d) managing the use of debt
e) normalizing infrastructure funding requirement

By asset category, the table below outlines the details of the reserves currently available to Orillia.

Asset Category	Balance at December 31, 2020
Road Network	1,305,000
Stormwater Network	2,267,000
Bridges and Culverts	763,000
Total Tax Funded:	**4,335,000**
Water Network	16,335,000
Wastewater Network	16,335,000
Total Rate Funded:	**32,710,000**

There is considerable debate in the municipal sector as to the appropriate level of reserves that a City should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should take into account when determining their capital reserve requirements include:

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook
e) internal reserve and debt policies.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Orillia's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

8.6.2 Recommendation

In 2025 Ontario Regulation 588/17 will require Orillia to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

9 Appendices

Contents

- Appendix A identifies projected 10-year capital requirements for each asset category
- Appendix B includes several maps that have been used to visualize the current level of service
- Appendix C identifies the criteria used to calculate risk for each asset category
- Appendix D provides additional guidance on the development of a condition assessment program

9.1 Appendix A: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements and maintain the current level of service.

Bridges and Culverts											
Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Bridges	$0	$125,000	$0	$0	$50,000	$0	$125,000	$0	$0	$0	$0
Structural Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$50,000	$0	$0
Total:	$0	$125,000	$0	$0	$50,000	$0	$125,000	$0	$50,000	$0	$0

Road Network											
Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Arterial Roads	$4,298,902	$7,669,830	$5,278,730	$2,157,400	$1,105,840	$1,645,190	$2,343,700	$1,204,280	$324,760	$998,890	$389,850
Collector Roads	$1,836,008	$4,206,616	$3,056,700	$444,360	$472,880	$313,030	$934,260	$496,340	$645,380	$269,560	$318,320
Local Roads	$9,871,222	$9,293,832	$8,795,660	$2,546,330	$1,432,440	$2,517,120	$2,957,570	$1,949,020	$4,861,740	$5,136,820	$3,128,460
Total:	**$16,006,132**	**$21,170,278**	**$17,131,090**	**$5,148,090**	**$3,011,160**	**$4,475,340**	**$6,235,530**	**$3,649,640**	**$5,831,880**	**$6,405,270**	**$3,836,630**

Stormwater Network											
Sub-Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Storm Mains	$6,093,892	$1,391,957	$170,969	$458,159	$174,427	$472,182	$217,073	$0	$0	$29,199	$19,210
Oil & Grit Separators	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pipe Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumping Stations	$41,976	$0	$0	$0	$0	$0	$0	$128,000	$0	$600,000	$0
Stormwater Management Ponds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total:	**$6,135,868**	**$1,391,957**	**$170,969**	**$458,159**	**$174,427**	**$472,182**	**$217,073**	**$128,000**	**$0**	**$629,199**	**$19,210**

Wastewater Network											
Sub-Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Forcemains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewermains (<200mm)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewermains (200-300mm)	$15,892,770	$0	$331,123	$0	$0	$492,168	$0	$0	$510,230	$468,087	$1,149,172
Sewermains (>300mm)	$1,565,796	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumping Stations	$640,000	$0	$0	$30,000	$85,000	$40,000	$30,000	$25,000	$268,000	$0	$2,660,000
Wastewater Treatment Centre	$1,182,500	$0	$20,000	$195,000	$32,500	$620,000	$0	$225,000	$2,732,500	$30,000	$1,012,500
Total:	**$19,281,066**	**$0**	**$351,123**	**$225,000**	**$117,500**	**$1,152,168**	**$30,000**	**$250,000**	**$3,510,730**	**$498,087**	**$4,821,672**

Water Network											
Sub-Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Watermains (<200mm)	$7,633,086	$0	$2,264,492	$0	$1,475,946	$0	$303,438	$0	$331,916	$0	$2,400,008
Watermains (200-300mm)	$3,142,400	$0	$0	$0	$285,762	$0	$747,302	$0	$760,068	$0	$1,030,118
Watermains (>300-450mm)	$1,017,352	$0	$0	$0	$0	$0	$0	$0	$0	$0	$436,990
Watermains (>450mm)	$6,874	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Booster Station	$0	$0	$0	$0	$0	$0	$0	$0	$8,500	$0	$0
Reservoirs & Wells	$8,000	$500	$30,500	$12,500	$16,500	$24,500	$500	$500	$42,500	$500	$500
Water Filtration Plant	$137,400	$3,000	$4,500	$69,250	$11,500	$711,800	$4,500	$612,000	$139,000	$72,000	$141,550
Total:	**$11,945,112**	**$3,500**	**$2,299,492**	**$81,750**	**$1,789,708**	**$736,300**	**$1,055,740**	**$612,500**	**$1,281,984**	**$72,500**	**$4,009,166**

All Asset Categories											
Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Bridges and Culverts	$0	$125,000	$0	$0	$50,000	$0	$125,000	$0	$50,000	$0	$0
Road Network	$16,006,132	$21,170,278	$17,131,090	$5,148,090	$3,011,160	$4,475,340	$6,235,530	$3,649,640	$5,831,880	$6,405,270	$3,836,630
Stormwater Network	$6,135,868	$1,391,957	$170,969	$458,159	$174,427	$472,182	$217,073	$128,000	$0	$629,199	$19,210
Wastewater Network	$11,945,112	$3,500	$2,299,492	$81,750	$1,789,708	$736,300	$1,055,740	$612,500	$1,281,984	$72,500	$4,009,166
Water Network	$19,281,066	$0	$351,123	$225,000	$117,500	$1,152,168	$30,000	$250,000	$3,510,730	$498,087	$4,821,672
Total:	**$53,368,178**	**$22,690,735**	**$19,952,674**	**$5,912,999**	**$5,142,795**	**$6,835,990**	**$7,663,343**	**$4,640,140**	**$10,674,594**	**$7,605,056**	**$12,686,678**

9.2 Appendix B: Level of Service Illustrations and Maps

Cedar Island Bridge


11/25/2019 15:29


11/25/2019 15:27


11/25/2019 15:24

Victoria Crescent Bridge


11/25/2019 15:08


11/25/2019 14:58


11/25/2019 15:04


11/25/2019 15:01

Kitchener Street Bridge


11/22/2019 15:16


11/22/2019 15:13

Brough's Creek North Bridge


11/22/2019 14:32

Brough's Creek South Bridge


11/22/2019 14:58


11/22/2019 14:52

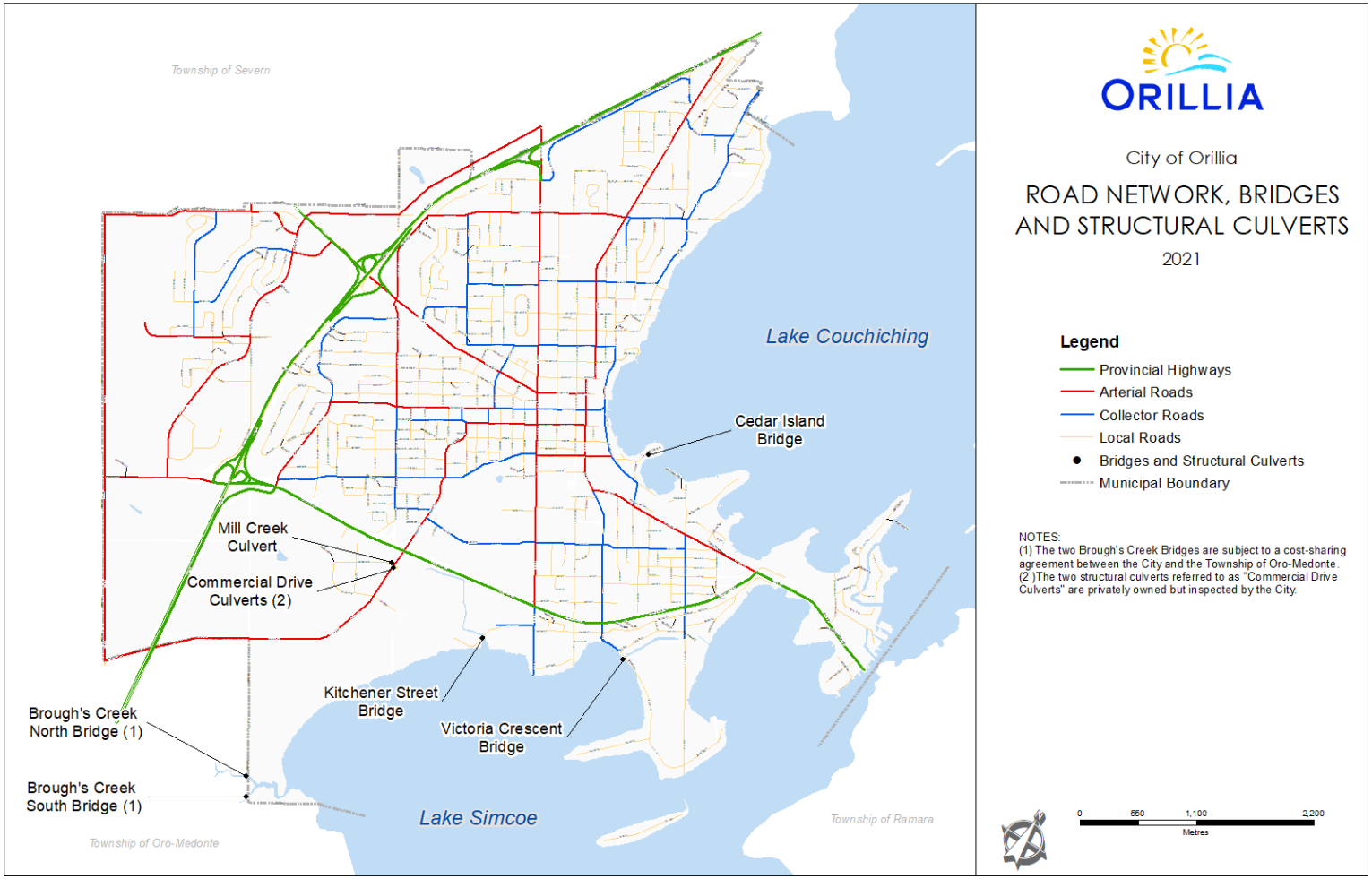

Brooke + Colten
BACK TO NATURE
11/22/2019 14:55


11/22/2019 14:45


11/22/2019 14:47

Memorial Avenue Culvert

Road Network Map



Pavement Condition Index (PCI) Scoring for Paved Roads

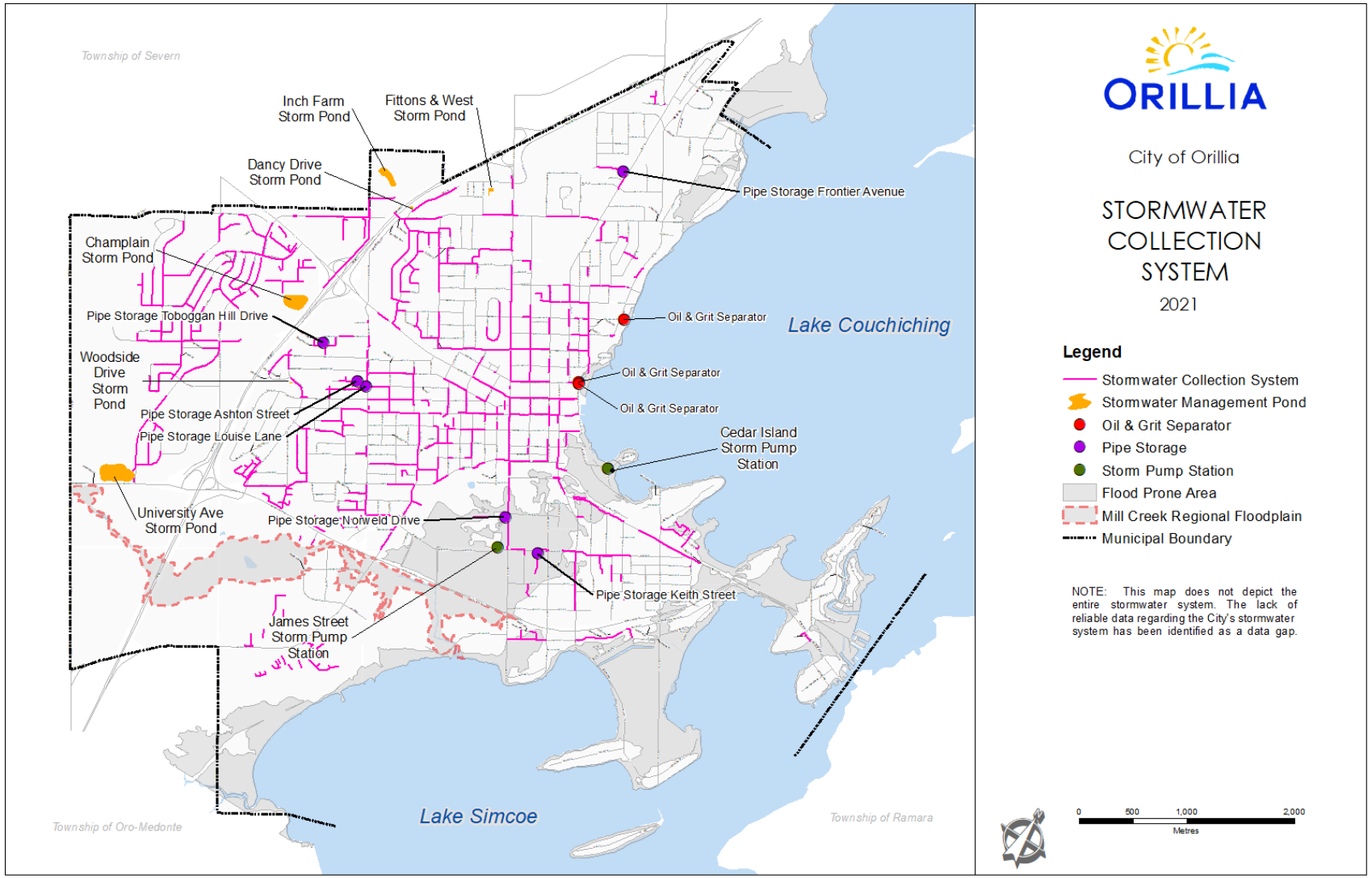
Front Street South – PCI 100

William Street – PCI 75

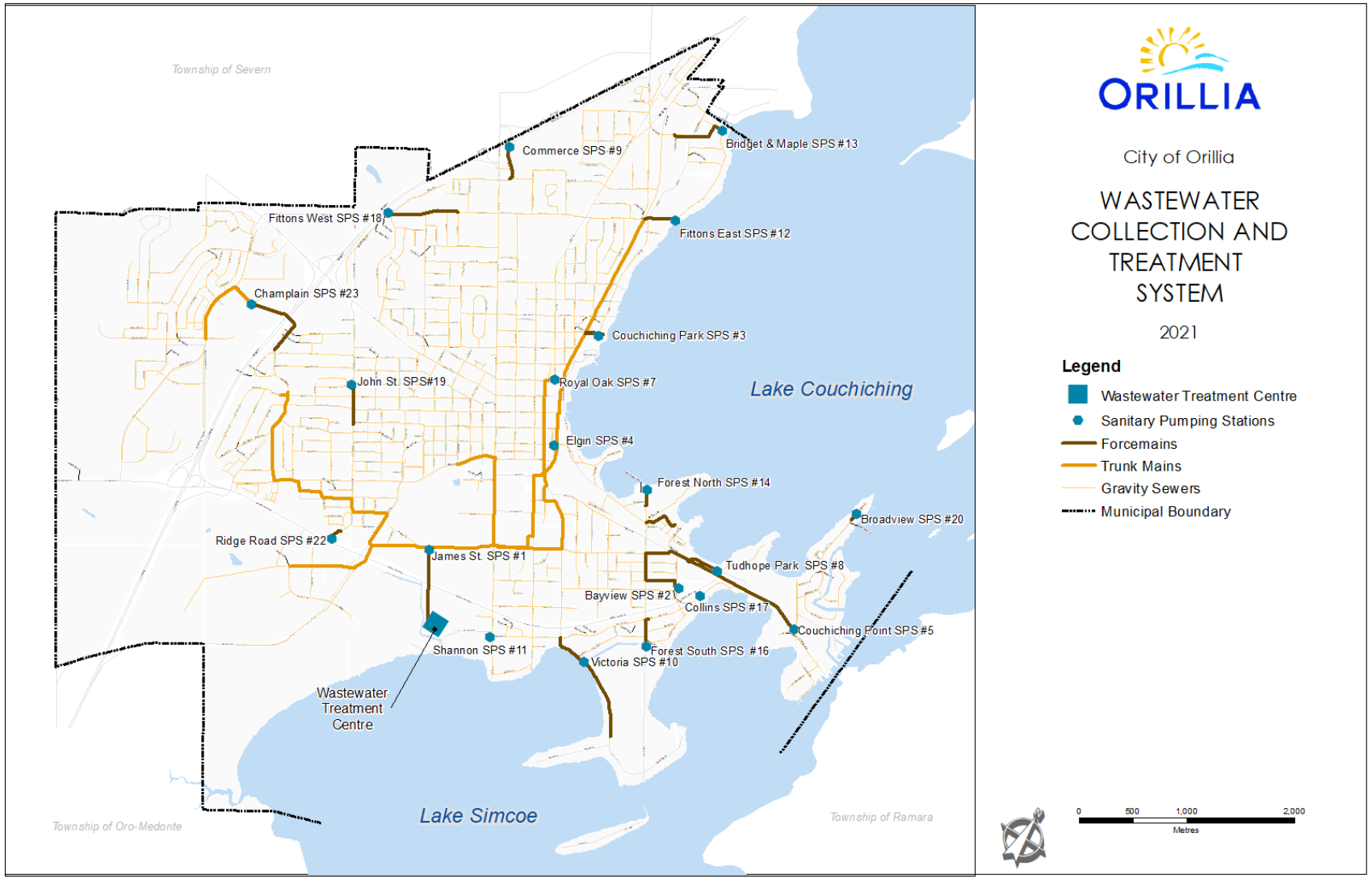
Park Street (Fittons Road West to Jordan Crescent) – PCI 55

Western Avenue – PCI 36

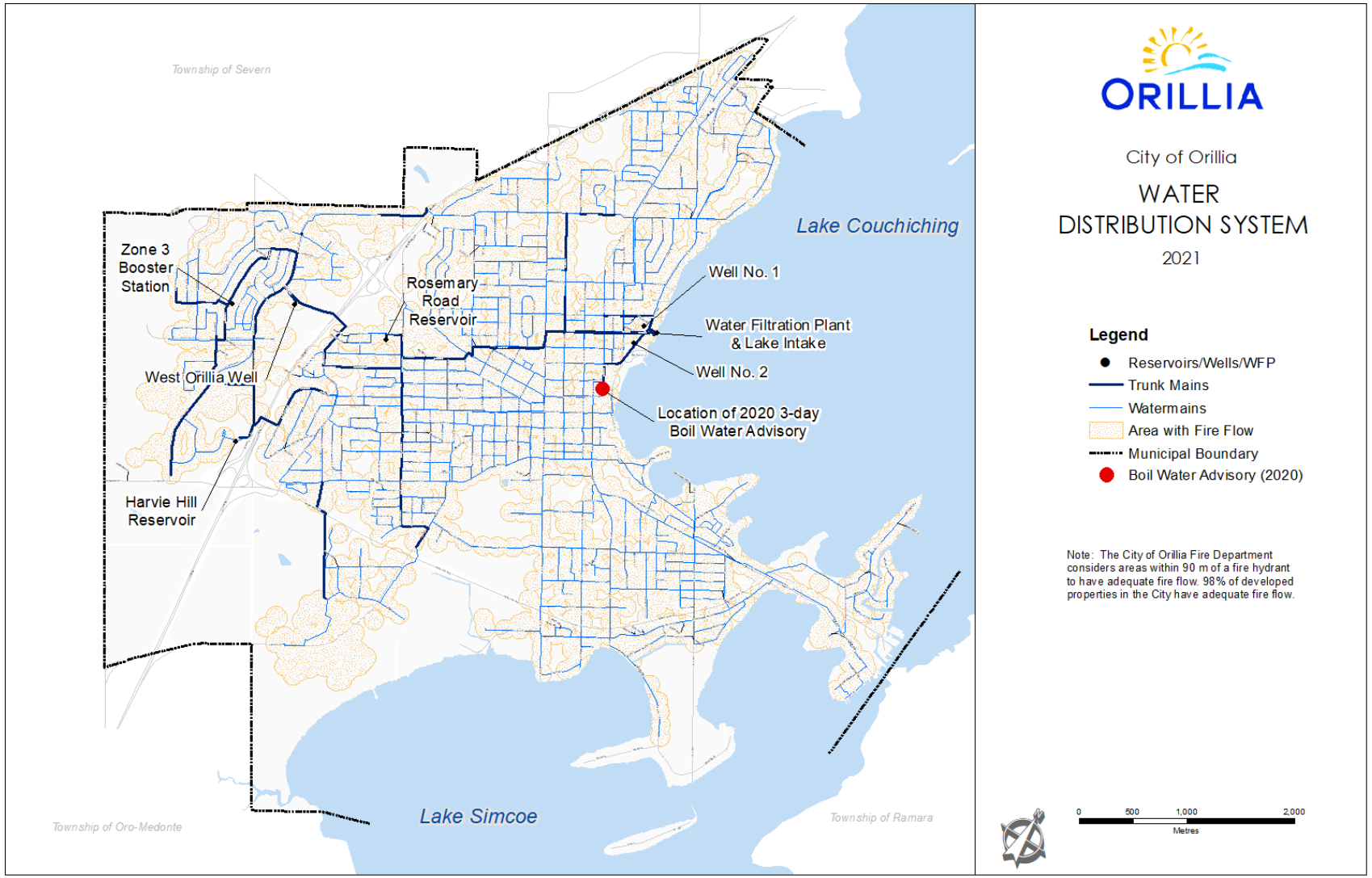
Stormwater Network Map



Wastewater Network Map



Water Network Map



9.3 Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Bridges and Culverts	Condition	100%	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5
Road Network (Paved Roads)	Probability of Failure (POF)	100%	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
Stormwater Network (Mains)	Asset Age (Years)	100%	=<15	1
			15-30	2
			30-45	3
			45-60	4
			60-75+	5
Stormwater Network (Other Assets)	Condition	100%	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Wastewater Network (Sanitary Mains)	Probability of Failure (POF)	100%	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
Wastewater Network (Other Assets)	Condition	100%	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5
Water Network (Watermains)	Probability of Failure (POF)	100%	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
Water Network (Other Assets)	Condition	100%	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Bridges and Culverts	Economic (100%)	Replacement Cost (50%)	$0-$5,000	1
			$5,001-$50,000	2
			$50,001-$100,000	3
			$100,001-$500,000	4
			$500,001+	5
		Condition (50%)	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5
Road Network (Paved Roads)	Strategic (100%)	Consequence of Failure (COF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
		Probability of Failure (POF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Stormwater Network (Mains)	Economic (100%)	Replacement Cost (50%)	$0-$5,000	1
			$5,001-$50,000	2
			$50,001-$100,000	3
			$100,001-$500,000	4
			$500,001+	5
		Asset Age (Years) (50%)	=<15	1
			15-30	2
			30-45	3
			45-60	4
			60-75+	5
Stormwater Network (Other Assets)	Economic (100%)	Replacement Cost (50%)	$0-$5,000	1
			$5,001-$50,000	2
			$50,001-$100,000	3
			$100,001-$500,000	4
			$500,001+	5
		Condition (50%)	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Wastewater Network (Sanitary Mains)	Strategic (100%)	Consequence of Failure (COF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
		Probability of Failure (POF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
Wastewater Network (Other Assets)	Economic (100%)	Replacement Cost (50%)	$0-$5,000	1
			$5,001-$50,000	2
			$50,001-$100,000	3
			$100,001-$500,000	4
			$500,001+	5
		Condition (50%)	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Water Network (Watermains)	Strategic (100%)	Consequence of Failure (COF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
		Probability of Failure (POF) (50%)	0-1.5	1
			1.5-2.5	2
			2.5-3.5	3
			3.5-4.5	4
			4.5-10	5
Water Network (Other Assets)	Economic (100%)	Replacement Cost (50%)	$0-$5,000	1
			$5,001-$50,000	2
			$50,001-$100,000	3
			$100,001-$500,000	4
			$500,001+	5
		Condition (50%)	=<1.8	1
			1.8-2.6	2
			2.6-3.4	3
			3.4-4.2	4
			4.2-5	5

9.4 Appendix D: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the City's condition assessment strategy should outline several key considerations, including:

- The role of asset condition data in decision-making
- Guidelines for the collection of asset condition data
- A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the City's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the City can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the City can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of condition assessments

there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

There are many options available to the City to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the City should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

- **Relevance**: every data item must have a direct influence on the output that is required
- **Appropriateness**: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
- **Reliability**: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
- **Affordability**: the data should be affordable to collect and maintain